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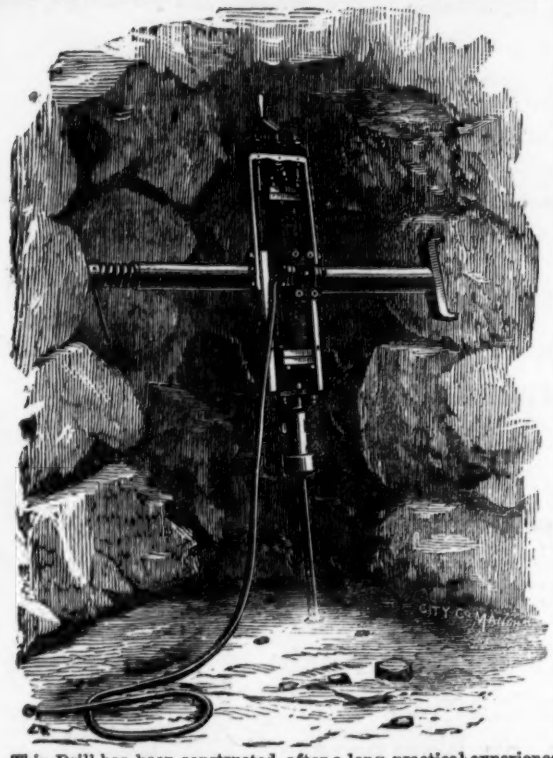

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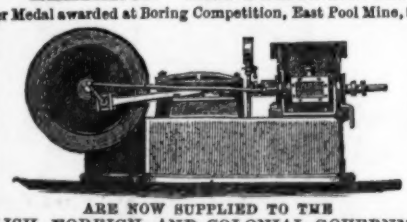

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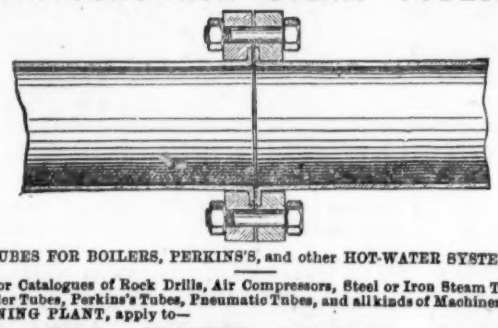

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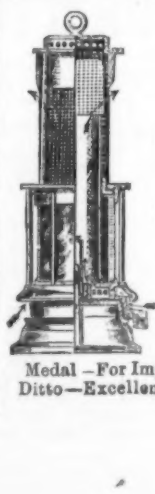

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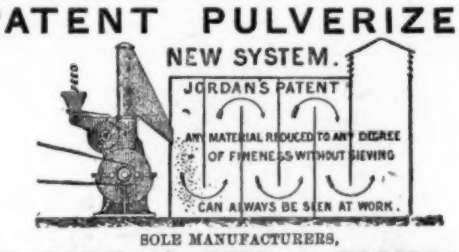

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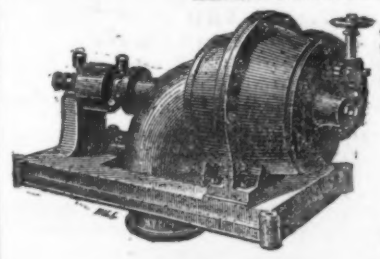

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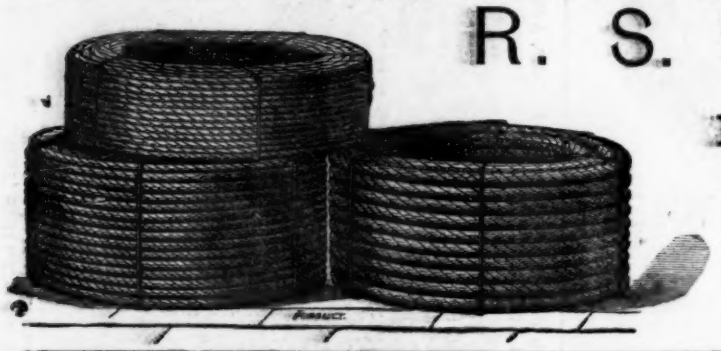

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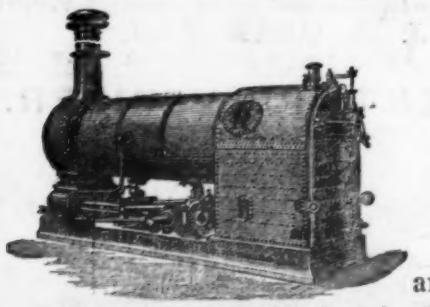

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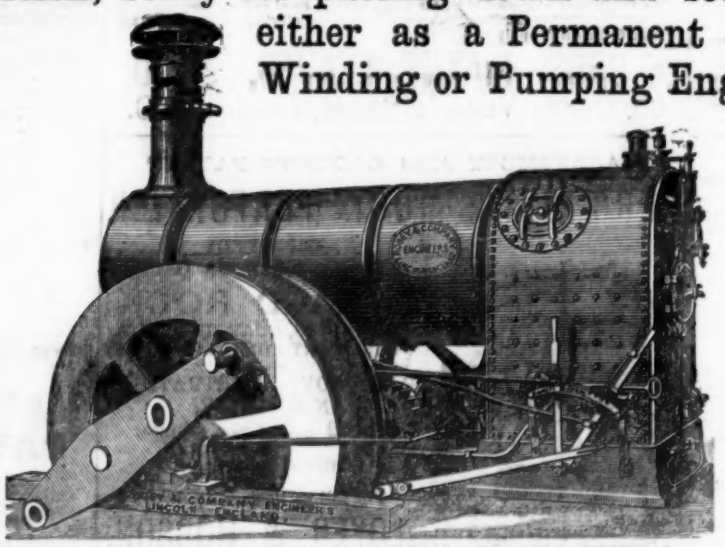

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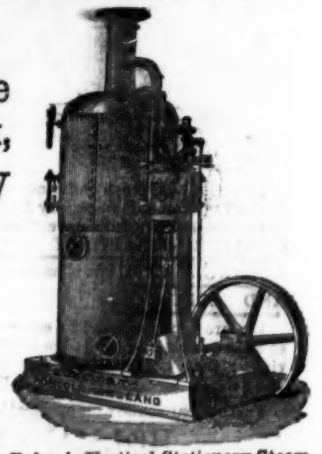

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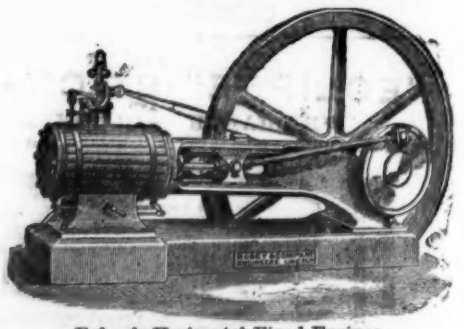

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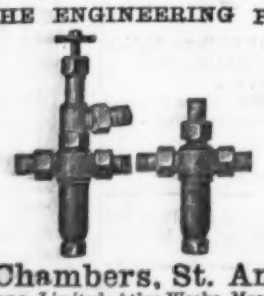

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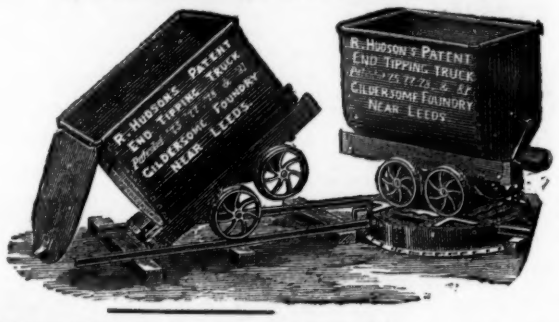
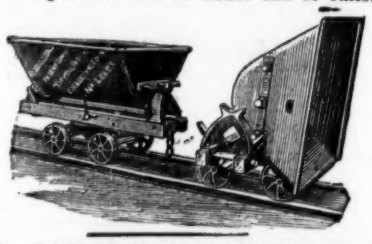
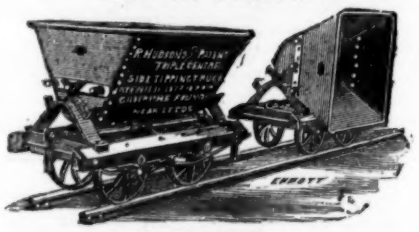


2. PATENT UNIVERSAL TRIPLE-CENTRE STEEL TIPPING TRUCK,
Will tip either SIDE or either END of rails.



ONE man can EASILY tip ANY WEIGHT in these wagons.

3.—PATENT TRIPLE-CENTRE STEEL SIDE TIP WAGONS.



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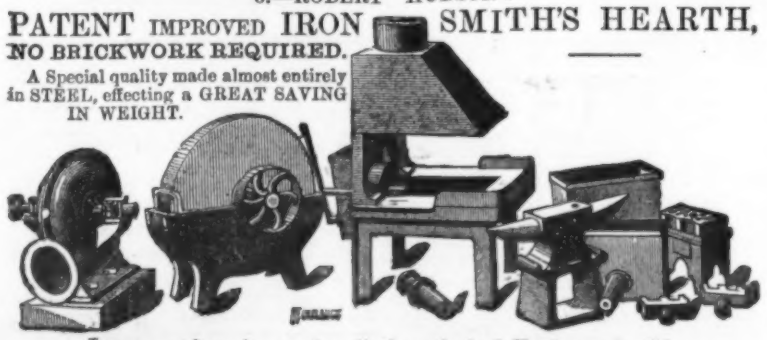
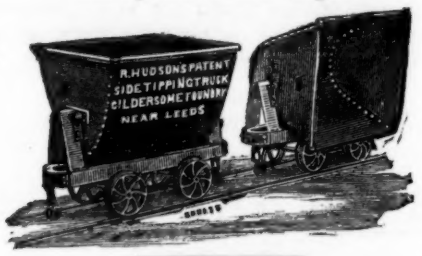
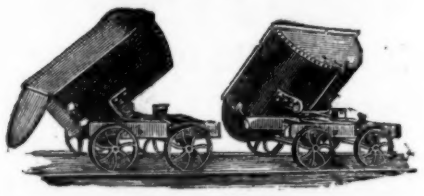


Large numbers in use by all the principal Engineers in this country and abroad.

8.- PATENT DOUBLE-CENTRE STEEL SIDE TIP WAGONS,
Will tip either side of Wagons.

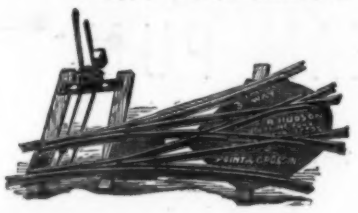


9.—PATENT STEEL ALL-ROUND TIP WAGON.

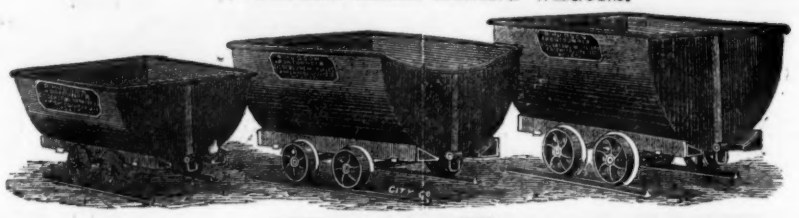


10.—LEFT-HAND STEEL POINT AND CROSSING.

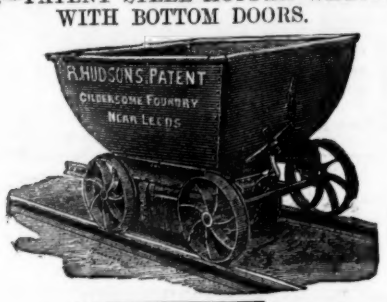
11.—RIGHT AND LEFT-HAND STEEL POINT AND CROSSING.



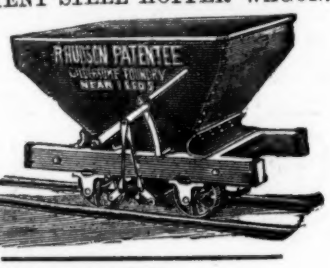
7.—PATENT STEEL MINING WAGONS.



12.—PATENT STEEL HOPPER WAGON, WITH BOTTOM DOORS.

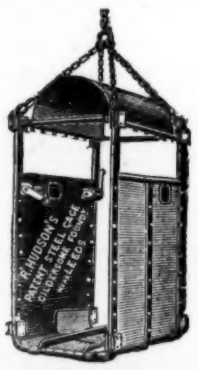


13.—PATENT STEEL HOPPER WAGON.



14.—SELF-RIGHTING STEEL TIP BUCKET.
(The "CATCH" can also be made SELF-ACTING if desired.)

15.—STEEL CAGE.



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BELL'S ASBESTOS BOILER PRESERVATIVE. This useful mixture by absorbing the free oxygen that is in the water entirely checks pitting and corrosion. It also disintegrates incrustation so immediately as to prevent its adhering to the plates. Not only is a great economy of fuel effected by keeping boilers clean, but the risk of having the plates burned is thereby obviated. It has been computed that ⅛ in. thick of incrustation causes a waste of 15 per cent. of coal; ¼ in., 60 per cent.; ⅜ in., 150 per cent. Thus the Preservative avoids the great risks which are inseparable from scaled plates, lengthens the life of a boiler, and covers its own cost a hundred-fold by economy of fuel. It is entirely harmless, and has no injurious action on metals. It can be put into the feed tank or boiler, as may be most convenient. Sold in drums and casks bearing the Trade Mark, without which none is genuine.

BELL'S ASBESTOS YARN and SOAPSTONE PACKING

for Locomotives, and all Stationary Engines running at very high speed with intense friction.

The following Testimonial refers to this Packing:—

Festiniog Railway, Locomotive Superintendent's Office,
Portmadoc, January 13, 1883.

Mr. John Bell, 113, Southwark-street, S.E.

DEAR SIR,

I have much pleasure in saying that the Asbestos Yarn and Soapstone Packing gives every satisfaction; indeed, better than we expected. We have a locomotive packed with it, which has been running five months (and think of the piston speed with our small wheels). I think the Soapstone a great improvement, as it keeps the packing elastic, and prevents it getting hard. I am very pleased with its working, and also the very low price for such good lasting Packing. The Asbestos Yarn we find is very useful, and answers admirably.

Yours truly,
(Signed) W. WILLIAMS.

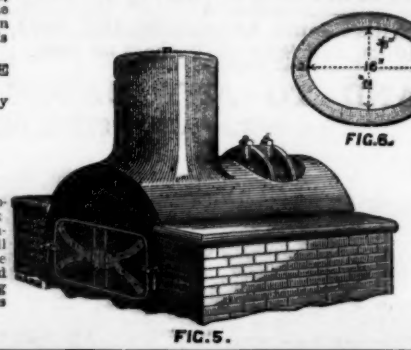

FIG. 5.

FIG. 6.

FIG. 1.

FIG. 2.

FIG. 4.

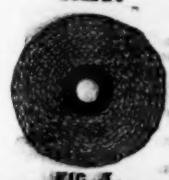

FIG. 3.

BELL'S ASBESTOS BOILER AND PIPE COVERING COMPOSITION, for coating every class of steam pipes and boilers, non-combustible and easily applied when steam is up; adheres to metals and preserves them from rust; prevents the unequal expansion and contraction of boilers exposed to weather; covers 50 per cent. more surface than any other coating, and is absolutely indestructible. It can be stripped off after many years' use, mixed up with 20 per cent. of fresh, and applied again. The composition is supplied dry, and is only to be mixed with water to the consistency required for use.

A Horizontal Boiler, 17 ft. 6 in. long, 15-H.P., gave the following results:—

Temperature on Plates - - - 186 deg.
" " Covering - - 94 deg.

One ton of coal was saved per week, and although the fire was raked out every evening, 20 lbs. of steam were found in the boiler next morning.

The following Testimonial refers to this Covering:—

Offices of the Wimbledon Local Board, Wimbledon,
Nov. 28th, 1883.

DEAR SIR,—It may interest you to know that we save exactly 40 per cent. in fuel through using your covering.—Yours truly, W. SANTO CRIMP, C.E., F.G.S.

BELL'S ASBESTOS and INDIA-RUBBER WOVEN TAPE and SHEETING, for making every class of Steam and Water Joints. It can be bent by hand to the form required without puckering, and is especially useful in making joints of manhole and mudhole doors; also for large "still" joints where boiling fat and steam have to be resisted. It is kept in stock in rolls of 100 ft., from ⅛ in. (Fig. 6) to 3 in. wide, and any thickness from 1/16 in. upwards. Manhole covers can be lifted many times before the renewal of the jointing material is necessary. The same material is made up into sheets about 40 in. square, and each sheet bears the Trade Mark, without which none is genuine. It is very necessary to guard against imitations of this useful material, and to secure themselves against being supplied with these inferior articles at my price, users are recommended to see that every 10 ft. length of the Asbestos Tape purchased by them bears the Trade Mark.

BELL'S SPECIAL LONDON-MADE ASBESTOS MILLBOARD, for Dry Steam Joints, made of the best Asbestos fibre, is well-known for its toughness and purity, and is absolutely free from the injurious ingredients frequently used to attain an appearance of finish, regardless of the real utility of the material. Made in sheets measuring about 40 in. square, from 1-64th in. to 1 in., and ¼ millimetre to 25 millimetres thick. Each sheet bears the Trade Mark.

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This material is admirably suited to steam pipe joints and every class of valve.

Valves made of this material are very durable, as they are not subject to injury by oil.

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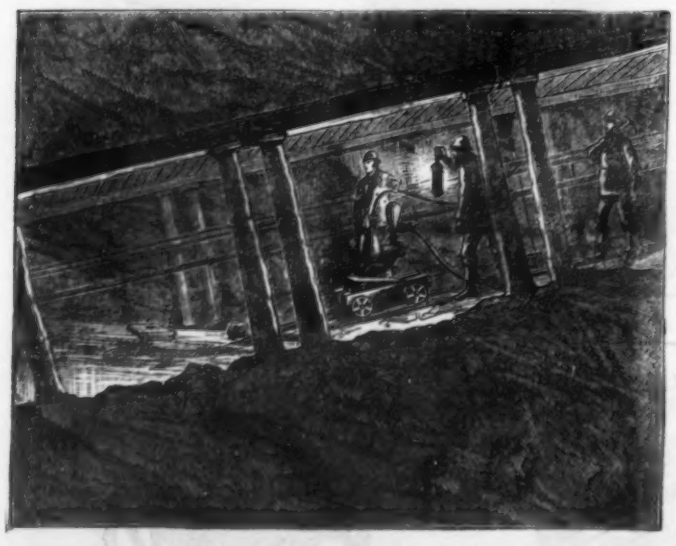

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Original Correspondence.

PACIFIC COAST MINES, AND THEIR PROSPECTS.

SIR,—I have recently made my annual mine inspection visit, and subjoin the field notes:—

GRASS VALLEY DISTRICT.—One foot of snow on the ground; drifts in some places 6 ft. high. Bear river and the other streams very full. Hydraulic mining going on as usual, notwithstanding Judge Sawyer's decision against the North Bloomfield. The Empire Mine is in litigation on account of a piece of ground claimed by Benallack and others. The Pittsburgh drain tunnel is completed, and is a fine work, draining the mine of all the surface water, and down to the 200 level. The tunnel is 6 by 4 ft, and has an iron tramway. The hoisting works, mill, and other machinery are all in good order. The Maryland is putting up hoisting works. The Idaho is paying its 172nd dividend. The mill and other surface works are very old-fashioned, but the managers (the Messrs. Coleman) are honourable and cautious old men, and the phenominal success of the mine proves that they are working it right. The ores now come from a distance of 2500 ft. from the shaft—at the extremity of the 1400 level—and cost more than they ought to bring to grass. The Pelton water wheels used to drive the works are a wonderful invention. The water from a hydraulic jet strikes the periphery of the wheels. There are four of them in use here. They develope 95 per cent. of the theoretical power. Next day went to Nevada City. Saw Walrath, manager of the Providence Mine, which Chapman and Grant attempted to float in London in 1881 for 300,000*l*. Mr. Walrath said the net profits of the mine at the present time were over 20,000*l*. a year. The Wyoming, with a 15-stamp mill, is also making money. On my return to San Francisco I met the president of Wells Fargo's Bank, who told me of a mine owned by a friend of his which netted him 300*l*. a day. A good property.

AMADOR DISTRICT.—On this trip I encountered a great deal of rain. At Niles a vast land slide occurred, covering the railway with earth and stones, and detaining the trains several hours. At Carbondale the coal mine which extends under the railway caved in, and the chasm had to be cribbed up and bridged over to permit of the passage of trains. The hydraulic mines at and above Ione City are going as usual. At Jackson City the water came down in sheets. The Keystone, which started in 1851, and has paid a great number of dividends, is still going and making money. The Consolidated Amador, owned by the London and California Company, is 2000 ft. deep—the deepest gold mine in the world except the Ararat mines of Victoria, which are but a few feet deeper. The Zeile is running 40 stamps. I looked in at the mill: everything in good order. The Empire and Pacific, each 80 stamps, are reported doing well. The Mahony, 40 stamps, is about to start up again. The Moore is idle. The Mammoth, south of Murphy's Ridge, has just taken $60,000 (12,000*l*.) out of one spot in the tunnel. It is in charge of a young Englishman named Neville. The De Witt mines on Murphy's Ridge have completed the tunnel to the ledge, and are ready to put up an 80-stamp mill. Meanwhile the managers are piping off the surface gold, and saving it in sluice boxes. They clean up once a week. The Lincoln Mine, which proved a failure under the late management, is about to start up again, but on a smaller scale. A good deal of bullion is shipped on the stage coach from this district. Look out for highway robberies.

SAN BERNARDINO DISTRICT.—Great changes have taken place here since my last annual visit of inspection. Two new railways connect the district with new points; numerous productive mines have been discovered in addition to those previously known, and everything is "booming.' The principal discoveries have been in the Halcomb, Pinacate, Calico, Providence, and New York districts, and include gold, silver, copper, coal, and garnet mines. The great Mohave mines were visited first. So much rain has fallen recently that a prodigious quantity of gold has been washed out by the itinerant miners, who are permitted to take what they can find. The men make about $5 a day by handwork while the rain last. According to a recent calculation these placers contain 50,000,000*l*. in gold, and yet no serious effort has been made to work them by machinery. About 500,000*l*. have been taken out by hand labour. The English company which worked one of the quartz mines up here has abandoned the property after selling the mill to the original vendor. It was a mistake to buy a quartz mine here. All the quartz has ages ago been washed down into the valley to make the rich placers. Plenty of water here. The Bear Valley water is now being utilised to irrigate the vale of San Bernardino, and float down timber from the Santa Ana. The Mohave water has been taken up by the Mohave mines. Returned next day to San Francisco, having visited the three districts (including personal inspections of eight mines) in five weeks.

ALEX. DEL MAR, M.E.,
Author of a History of the Precious Metals, &c.

San Francisco, Feb. 27.

AUSTRALIAN TIMBERS.

SIR,—It is surprising that such strange notions should have been ever entertained that Australia was deficient in timbers suitable for building and industrial purposes. A visit to the Kew Gardens Museum will at any time dispel the illusion. Not only does Australia possess many varieties of the best kinds for buildings, bridges, piers, wharves, fencing, &c., but also many varieties of beautiful timbers well suited for furniture and ornamental work. Western Australia possesses vast forests of magnificent timbers, some of which may be termed the best in the world, notably the Jarrah timber, or what was formerly known as Swan river mahogany. This wonderful timber is virtually indestructible; neither sea or fresh water appears to have any appreciable effect on it. Thus, for instance, the colonial vessels built of this wood do not require coppering, as neither marine or land insects appear to have any effect on it. I have seen samples of this Jarrah timber that have been used as piles for 40 years, shown at the Exhibitions in Melbourne, which were as sound as when put in, specimens of which I sent to India at the time. In consequence of the energy of the Western Australia Timber Company and others in developing the Jarrah timber trade, it is now being extensively used in the Australian colonies, New Zealand, and India for railway sleepers, piles for piers, wharves, jetties, &c. The timber is proving so effective in its uses, and being of such an imperishable nature, that the demand is increasing faster than the limited number of saw mills and tree fellers now working can supply. There is but little doubt when the value of the Jarrah, the Tuart, and other valuable Western Australian woods are better known in England that they will be extensively used.—*March* 19.

THOMAS CORNISH, M.E.

AUSTRALIAN TIMBER.

SIR,—In last week's *Mining Journal* I notice an article upon "Australian Timbers," and quite agree with you in contradicting the assertion that Australia is deficient in timbers suitable for building and industrial purposes. In your remarks on this subject I am sorry to see you did not include the Western Australian Jarrah, which is generally conceded to be one of the most durable timbers known. Baron von Mueller, of Melbourne (who is recognised as the highest authority), says in one of his numerous works:—"The Jarrah or mahogany tree of South-western Australia, famed for its indestructible wood, which is attacked neither by chelura, nor teredo, nor termites, and therefore so much sought for jetties and other structures exposed to sea water; also for any underground work, and largely exported for railway sleepers. Vessels built of this timber have been enabled to do away with all copper-plating. It is very strong, of a close grain, and a slightly oily, resinous nature; it works well, makes a fine finish, and is by shipbuilders here considered superior to either oak, teak, or any other wood." After quoting such an authority little more can be added as to the many purposes for which it is advisable to use timber generally; but so far as can be ascertained during the last forty years the Jarrah timber is impervious to the attacks of all known forms of decay. This timber has been largely exported to South Australia, Victoria, New Zealand, India, and Cape Colony for harbour works, railway bridges, and sleepers. At present the demand exceeds the supply obtainable from the saw-mills of the colony. In addition to the Jarrah there is in Western Australia a timber called Tuart, which is in great demand for railway trucks and other purposes where great strength and wear-resisting qualities are required. This timber is, according to experiments, the strongest known, as well as being the hardest in the world. Besides these well-known timbers there are many others in Western Australia, including the York gum, red gum, whandoo, and the splendid ornamental woods for furniture making. Specimens of Jarrah and Tuart can be seen in London at the office of Messrs. Newton, Jenkin, and Co.

Woburn-place, March 17. GEORGE SIMPSON.

THE GOLD FIELDS OF QUEENSLAND.

SIR,—Since my last there has been considerable excitement in mining circles here in consequence of the excellent news from Gympie respecting the South Wilmot yields, and all claims adjacent were well in favour. The Extended claim advanced to 21s. Sales of North Wilmot were effected at 4s. They will be higher to-morrow. Sales between exchange meetings were made at 2s. 9d. and 3s. 3d. The South Wilmot holders are now asking 16s. Sales were reported at 10s., 11s., and 13s. Monkland and Abyssinian advanced from 2s. to 3s., whilst buyers offered 6d. less. Enquiries were also made for South Abyssinians at 6d. These are all effected by the South Wilmot success. Union Extended made sales at 1s. 3d. Enquiries were made for Lucknow prospectors', but no offers were made. Deep leads were not mentioned. With regard to Herberton enterprises, Caledonian tin sold at 4s., and Silver Valley at 1*l*. Mr. A. Costello has received a telegram from Gympie, stating that 600 ozs. of gold had been picked from 10 tons of stone taken out of the South Wilmot claim. Mr. W. Flynn has also received a telegram from Gympie:—"Magnificent specimens banked from Lucknow prospectors'. Some of the stones contain over 20 ozs. of gold."

The average ley of the gold rock appears to be about 1¼ oz. to the ton all through; thus, in October 4544 tons crushed yielded 5701 ozs., or at the rate of 1 oz. 5 dwts. 2 grs. to the ton, while in November (the last month for which returns are to hand) 5043 tons crushed yielded 5971 ozs., or at the rate of 1 oz. 3 dwts. 16 grs. to the ton. Warden Lukin (Dec. 19) reports:—November was a good month for many on this field. The Lucknow p.c., Monkland and Abyssinia, Wilmot Extended, North Wilmot, South Wilmot, and London Extended are amongst the new claims that give evidence of being largely remunerative properties. Amongst old mines that are again giving good payable crushings, I may mention the Phœnix p.c., two and three South Smithfield and the North Glanmire. The dividends paid during November were considerably above the average—one Gympie miner having taken 2500*l*. for three weeks' work, 1800*l*. for the previous three weeks, and 1000*l*. for the three weeks before that, with every prospect of a continuance for some years of large profits. In this case the miner referred to has by energy, perseverance, pluck, and a clear intelligence, backed with capital, originally, I may say, dug up in the early days of Gympie, commanded success. He is not a lucky digger, but one who has studied mining as a profession, and, by dint of the knowledge acquired and hard work, achieved his object. All admit that he was the mainstay of Gympie during years of depression, and that to him is mainly due the present prosperity of the field. I need hardly say no one begrudges him the just reward he is now receiving.

Another silver discovery has, says the Herberton Advertiser, been made, the surface stone assaying 123 ozs. 12 dwts. 20 grs. of silver to the ton. The assay may be said to be an average sample, as the stone was indiscriminately taken from four different parts of the surface lode with a view to discovering its real value. The mining world at Watsonville have been greatly excited over two very important discoveries—the striking of grand tin at a depth of 200 ft. in the Caledonia, and the magnificent find recently unearthed at Eureka Creek on the boundary of Messrs. Joss's and party's claim. One of the prospectors states that in two hours they brought to grass no less than 10 tons of grand bagging ore. N. B.

Brisbane, Jan. 4.

OPHIR AND RUSH VALLEY MINING DISTRICTS—No. VIII.

MOUNTAIN RANGES OF UTAH.

SIR,—Most of the mining districts of Utah are situated in and confined to the two principal mountain ranges of the said territory. These ranges run on either side of the Jordan Valley, almost parallel to each other, and are known as the Wasatch and Aquirrh Ranges.

The Wasatch Range extends from the Territory of Idaho, on the northern boundary of Utah, to the Colorado river at the south, running in a south-westerly direction through the central portion of Utah, and forming the division between the Great Salt Lake basin on the east north-east and the waters of the Colorado river on the west north-west. The flanks of this range differ materially in their geological structure and appearance; the eastern flank is formed either by a series of broad terraces and plateaus, or the same appear in long waving ridges and slopes, such as are peculiar to the apex of the coal formation. In the eastern flank we observe mainly the sandstones, shales, and limestones, peculiar to the cretaceous and tertiary ages in which appear the large coal beds known in Utah Territory. The western flank of the Wasatch is very steep and abrupt, and comprises the older crystalline rocks of the silurian, devonian, and the carboniferous ages, in which appear the rich mineral deposits, and which are the treasure chambers for which Utah is justly celebrated, amongst the treasures of the United States of America. The altitude of the Wasatch Range varies between 8000 and over 13,000 ft. above the level of the sea. It is also a peculiar phenomenon that the dislocations of the formations on the western flank are more numerous and extensive than those of the eastern. The principal mining districts situated in the Wasatch Range are—Portage, Logan, Milville, Mineral Point, Willard, Bear Canyon, Adams, Mill Creek, New Eldorado, Uintah, Blue Ledge, Big and Little Cottonwood, American Fork, Silver Lake, Draperville, Snake Creek, Provo, Cook, Spanish Fork, Santaquin, Timmons or Mount Nebo, Canal, Gordon, Granite, Beaver, Ohio, Warsaw, Antimony, Summer, Iron Spring or Magnetic, Silver Belt, Pinto, and Harrisburg mining districts.

The Aquirrh Range commences at the centre of the Great Salt Lake, and extends far into the southern part of the territory. The formations of this range are entirely of the rocks peculiar to the silurian, devonian, and carboniferous ages, and show a series of extensive breaks and faults. The mining districts situated in the Aquirrh Mountain Range are—West Mountain or Bingham, Tooele, Rush Valley or Stocton, Ophir, Camp Floyd, Cedar Valley, Osceola, Spring Pass, Utah, Tintic, and Oak Creek mining districts.

Both mountain ranges are crossed by powerful and extensive dykes of eruptive rock, representing principally granitic, syenitic, dioritic porphyries, and diabas; besides the before-mentioned large and principal mountain ranges of Utah are several others of less extent. The first of these is situated about 18 miles west of the Aquirrh Range, and known as the Onoqui or Scull Valley Range; this range begins at the western side of the Great Salt Lake, and extends into Sevier Valley, where it disappears in the desert plain. The mining districts situated in the Onoqui Mountain Range are—Lake Side, Columbia, and Indian Spring districts.

West of the Onoqui Range appears the Cedar Mountain Range, which is more extensive than the former, commencing on the Central Pacific Railroad by Summit Station, and running southerly through the great desert, a distance of more than 300 miles. The mining districts situated in the Cedar Range are—Dugway, Desert, Granite Mountain, Snake Valley, Drum, Sevier Lake, and Saw Back mining districts.

The next is the Snake Range, which forms the western boundary line of Utah, between this territory and the State of Nevada. The mining districts situated in the Snake Range, and spurs thereof are—Rose Bud, Pilot Peak, Newfoundland, Silver Islet, Dutch Flat, Clifton, Hastings, Kern, Pleasant Valley, Wilson, Sacramento, and Lexington mining districts.

The formation of the last named two ranges consists chiefly of granite, porphyries, basalt, silurian schists, quartzite, and lava. There is as yet little known about the mineral wealth of the last-named three ranges, as the same has only been explored by the hardy miner in a few places, but such explorations as have been made give great hopes for their future, with the future of Utah at large.

Gordon, Galena, Bradshaw, and Lincoln mining districts are situated in the Mineral Range, which is evidently a spur of the great Wasatch Range. West of the Mineral Mountain Range is the Beaver River Range, with the Picacho, San Francisco, and Wah Wah Mountains, in which are situated the Beaver Lake, North Star, Rocky Star, Preuss, San Francisco, and Pine Grove mining districts. West of the Beaver River Range are the Pinon Mountains, in which is situated Washington mining district.

W. BREDEMEYER, M.E., U.S. Surveyor.

Salt Lake City, Feb. 22.

AUSTRIAN GOLD MINES, AND BRITISH CAPITAL.

SIR,—In Ober Kärnthen, Austria, there were a great many gold mines in the 14th and 15th century which came to a standstill after the Protestants had been driven out the country, and had since that time not been worked again. Minute explorations by a renowned miner have resulted in showing that in the track of those ancient gold mines there are a considerable number of shafts and layers of precious ores, containing, besides gold, also silver, lead, copper, quicksilver, &c., which have not lost much in their richness by the mining of the ancients. We have, however, found several lodes that show at the bassets or seams already some precious metals.

All these beds so extremely auriferous promise an extraordinary high profit to any mining enterprise. The application of electric machines and arrangements is specially to be recommended, as there are immense water powers there, and the whole formation of the country seems as created for the purpose. The tract of land contains about 12,000,000 square metres, and has since four or five years been thoroughly examined by the Director of Mines (Bergdirector), Mr. Roctata. His examinations are finished, and the result of them are that immense quantities of precious metals are contained in those mines, and would yield a high profit to any rational mining enterprise. The results of his explorations are shown in a book of about 368 pages printed matter, with four maps or plans of working. I feel convinced that there is an ample field to form a company for the purpose of working these mines with a considerable capital. I will send you a few short extracts from the reports mentioned.

Mayence, March 18. FERDINAND KAHN.

GUINEA COAST GOLD COMPANY.

SIR,—Allow me to inform "R." that I hold several hundred shares in this company, and paid 1*l*. each for them. If notwithstanding that every promise held out in the prospectus has proved to be devoid of any foundation in fact, and if notwithstanding the non-publication by the directors of the true state of matters for 12 months, until, indeed, concealment was no longer possible, "R." still believes in the company and thinks the directors worthy of his confidence, I can only say that his faith must indeed be boundless. He apparently has a hi h opinion of the economical management of these gentlemen. What does he think of their paying Capt. Burton 800*l*. and more for going out to take possession of the property? To my thinking no greater waste of a company's funds was ever committed! If some honest and competent mining engineer had been paid 500*l*. to go and inspect the rich reef before it was paid for, the money would have been well and wisely laid out, for if his report had been acted on this company would have saved 65,000*l*., and the syndicate would have had to dispose of its valuable property to a less wary purchaser, if such a one could be found.

Of course, I am aware of the statements now made about the new rich reef, found only 70 miles away from the old one, and the reported assays of samples said to have come from it; but I have not forgotten, as "R." seems to have done, the glowing reports about the original rich reef, and the samples from it, one, it was said, giving up to 13 ozs. to the ton. Need I say that I believe these new reports just as much as, but not a bit more than, the first? Time will show whether I am right or not. "R." throws doubt on my *bona fides*. Let me say that it seems surprising to me that any mere shareholder who has paid par for his shares should write as "R." does. Is it possible that he, too, was a member of the syndicate that divided such an enormous profit on the sale of the original rich reef to this company?—*Brighton, March* 17. P.

GOLD COAST MINING COMPANY.

SIR,—As Mr. Power's letter in last week's *Mining Journal* might, perhaps, if unanswered, mislead some persons who may not be acquainted with all the facts of the case, and as his letter is as much an attack upon me as a defence of Captain Molesworth, I trust that you will kindly allow me a few words in reply. . . .

It is not the fact that I was "more blamed than anyone else" for the irregularities which the committee found to exist in the management, except by Mr. Power. No one else has hinted at such a view. It is not the fact that my views about "parties," or any question of the kind, has ever led to my "failure to get on in more places than the office of this company." "The attitude" I "used to assume towards the Chairman" was purely a defensive one. . . .

However, the main question for us all now is the intentions of the new board, and the consequent prospects of the company. If the board carry out the provision mentioned in the circular of March 13 as problematical only—the appointment of a trustworthy and competent consulting engineer, and if they allow him to manage the mine, there can be no doubt that dividends are not far off. Our danger hitherto has been having an amateur mining engineer for a Chairman. But I have never questioned Capt. Molesworth's honesty of intention, or his great abilities of a certain kind; and if he is not allowed to over-ride or circumvent the new board as he did the old one, he may yet make a useful director. ALGERNON JOY.

Wilton-place, March 19.

[Some personal references are necessarily omitted from Mr. Joy's letter, as they appear calculated only to reopen now cicatrised wounds. Much of the ill-feeling and disagreement displayed in this and in other companies between officers of the company and between officers and shareholders arises from the now too general practice of secretaries regarding themselves as the masters instead of the servants of the board and of directors considering themselves the masters instead of the highly-paid servants of the shareholders.—ED. *M. J.*]

A DISCURSIVE VIEW IN THE INTEREST OF MINING—No. VIII.

SIR,—If mining did not possess an inherent vitality superior to almost every other speculative industry it must long since have expired—crushed beneath the agonies of unmitigated torture. If it were not a productive industry *par excellence* it must have succumbed long since; but the repeated barbarous outrages it has been, and still is, so unmercifully treated to appear to produce only a temporary, unnerving, or suspending effect, from which it quickly revives, and assumes, as before, an obliviousness of consequences. The trite aphorism—"Whom the gods intend to destroy they first make mad"—is only in part realised in the more elaborate programmes, blindly or idealistically conceived to intoxicate reason, inflate the fancy, and ensnare the too-willing votaries at the shrine of credulity improvised to Mammon—the abdicators of common sense as their guide and exponent. The madness referred to in the aphorism quoted is a glaring reality, whilst the destined destruction of the infatuated victims merely awaits the revolution of events systematically contrived to perpetrate with some show of plausibility the doom intended. If the products of mines were manufactured articles they could not be supplied to order with greater conformity of design and precision of adapation to the caprices of vanity, and the bumptiousness of egotism. A proclamation goes forth of a willingness to pay a good price for a good article—prominently specified. They do not exist, but the prospect being assuring they are substitutionally improvised. The good price is paid in exchange for a reputably superlative concern, and the first flush of feeling generally kindled in the breasts of parties of the second part is expressed in self-congratulatory encomiums on the good fortune which led them to identify themselves with such an enterprise—the sequel of which can alone undeceive them. South Sea bubbles may explode or collapse, to be succeeded by others of a kindred type; but the fatuity of credulity survives, and appears as ready as ever to embrace and materialise those phantom shapes, gilded by the colouring of artifice, whether skillfully or clumsily ap-

plied. Oh, the magical fascination of gold, no matter how illogical or improbable its alleged sources may be the influence of its sound is in certain events irresistible. Take the following as an instance—A certain prospectus states in respect of alluvial accumulations and their source—200,000,000 of tons of alluvial deposit, presumably in a basin-shaped hollow. The source of its derivation the adjacent hills, whether advancing in elevation in one or more directions; the area of deposit said to be 5000 acres; average depth, 21 ft.; contents of deposit as above, 200,000,000 tons—the estimated average value of which is stated to be 1s. per ton. The principal if not the sole sources of this wealth—for I presume we must now consider it as such from its recent engrossment—is stated to be three reefs, varying in thickness from 1 to 18 ft., the mean of which would be 9½ ft., and as there are or said to be three such reefs the chief source of the gold appears to be limited to a width of 28½ ft., the average value of which is given as 13 dwts. per ton. When doctors differ, it has been asked, who shall decide; but it does not necessarily follow that either one or the other averments are correct.

In the prospectus referred to one of the professors is represented as having stated that his estimate of profit from quartz crushing would amount to 420,000*l.* per annum, and from alluvium washing 830,000*l.* per annum, making together 1,250,000*l.*; whilst another of the professors states that the profits from the alluvium sources will be 420,000*l.*, and from the crushing of quartz 852,000*l.*, aggregating 1,272,000*l.* profit annually. These statements show an inversion of figures if not facts—if facts were at all consulted in the premises, and the trifling difference of 22,000*l.* per annum in respect of profit. Both these statements appear to have been given and received in good faith as correct or otherwise, as if such trifling differences counted as nothing in the balance of verities. If fundamental differences of this kind are regarded as immaterial it may with fullest truthfulness be affirmed that "circumstances alter cases"—or that where presumption sets up its standard logic, fact, and mathematics have no jurisdiction or influence. The figures in the prospectus as furnished by the general manager of the Cape Commercial Bank, showing the returns of gold through that channel to Nov. 22, 1880, as 4277¾ lbs. nearly, may appear at first sight somewhat imposing; but it should be remembered that they include the whole of the purchases of that bank from the entire district of Lydenburg from first to last, but other amounts, we are informed, were disposed of through other channels. But whatever they may have been there can be no doubt but that their aggregate together with that given above sink into comparative insignificance in comparison with the amount necessary to realise the results anticipated by the promoters and abettors of the colossal scheme in question. If, according to the professor's statement, profits are to accrue amounting to 1,272,000*l.* per annum, from 18 to 20 tons of gold for such period will be necessary to that result, as the quantity requisite to realise alone the profits will exceed 13 tons annually. I shall not presume to aver that the enterprise is not equal to that or any other result, as I do not know; but probabilities influence, if they do not control, one's reason and judgment, and here it must be affirmed that they are not too propitious. The alluvium, it must be remembered, is estimated at 1s. per ton gross value, and the quartz reefs at 13 dwts. per ton; these estimates from the data of samples comparatively few in number, or conclusions jumped at, and not from working tests or practical inroads made in the reefs themselves. It is not an uncommon occurrence that gold on the surface of rocks exposed for ages and generations to atmospheric influences is found in greater proportion than interiarly. Quartz and all other minerals are as well known; atomically composed gold is not, and disintegratable, except as a whole, from its associations, with which it is merely mechanically combined, whether in greater or less abundance.

When millions of pounds sterling are in question as the proceeds or outcome of a speculative enterprise it behoves all interested, whether directly or indirectly, to investigate the fundamental sources from whence the returns anticipated are expected to be derived, and in this case sceptism on the part of anyone can at the utmost be but a venal offence—one easily excused, if not generously pardoned.

I do not write this in a spirit of antagonism to the enterprise in question, but from the sincerest doubt respecting its *bona fides*. No one can more ardently desire the success of British enterprise in whatever part of the world it may be embarked than I do; nor would anyone, I think, do more than myself to promote it. English investors merit success, and might more generally command it, especially in mining if proper precautions were at all times adopted; but a reckless disregard of prudential measures is not the way to secure it.—*Ione, Nye County, Nevada, Feb.* 24. ROBT. KNAPP.

GOLD FIELDS OF GUAYANA.

SIR,—About two years ago a company was formed in London, and registered with a nominal capital of 1,000,000*l.* sterling, under the name of the Guayana Company (Limited), the objects of the company, as set forth in the prospectus, to work under certain concessions granted by the Government of Venezuela, amongst them being included gold mining operations, and the construction of a railway from a point on the River Orinoco to the town of Guacipati, situate in the centre of the rich auriferous district of the Caratal, in Guayana, the distance being about 100 miles. I understand the survey for this line has been completed, and besides the large traffic that is assured in connection with existing mines, it possesses some important advantages such as extensive grants of lands for agricultural and other purposes, that will become the property of the company. And further, the Government of Venezuela, anxious to assist in the development of the industrial wealth of the country, has quite recently granted to this railway a guarantee of 7 per cent. interest upon the capital employed in its construction and equipment. Under these circumstances, and with these special advantages, it is matter of surprise in Venezuela that this enterprise has not been pushed forward with greater vigour, and that the energy and push that usually characterise English enterprise abroad seems to be utterly wanting in this instance.

It is difficult to understand the apathy and inactivity of the directors of the company, and why English capital has not yet been invited for an enterprise like this, which combines all the elements of great and speedy success, as it is simply a question of construction of about 100 miles of railway without any engineering difficulties. Perhaps some one of the numerous readers of the *Mining Journal* may be able to explain this masterly inactivity on the part of the directors of the Guayana Company, so prejudicial to the few existing shareholders, and to the true interests of the various English enterprises already in operation in connection with the gold mines of Guayana.—*Palmerston Buildings, March* 20. S. D. P.

ROYAL NATIONAL MINERS' LIFE SAVING INSTITUTION.

MISDIRECTED PHILANTHROPY AND ERRONEOUS STATISTICS.

SIR,—In his attempt to obtain support for the enterprise to which the above title has been given, Mr. Thomas Fenwick, the promoter, has made the statement that "There are 500,000 persons employed in our coal mines; and of these in 1878 not less than 1413 were killed, and within the last 10 years, since the passing of the Miners' Act, the yearly average has been 1200, or one in every 38 employed, as compared with one in 75 of our sailors lost at sea. But in addition is the fact that there are many other accidents in mines not officially recorded, and it is believed the total lives lost in our mines is 2500 every year, 48 every week, or 8 every day."

A very slight attention to these figures will show that the first assertion is a most palpable error, for if 500,000 be divided by 1200 the quotient is 416 instead of 38, so that according to Mr. Fenwick's own statement, when his blunder is corrected, the loss is only one in every 416. The second portion of his remarks, which is a pure assertion, uncorroborated by any evidence worthy of consideration, displays great ignorance of the coroners' clause of the Mines Act, 1872, and supposes that the Mines Inspectors are either stupid or are wilfully suppressing information. The following table taken from the Board of Trade Returns, and given by Mr. G. C. Greenwell in an address on the occasion of his being elected President of the North of England Institute of Mining and Mechanical Engineers, shows the accidents compared with the number of persons employed in various occupations:—

Employed in—	Persons employed.	Deaths by accident.	Ratio of persons employed to each death.	Death rate per 1000 persons employed.
Mines, 1876	514,532	933	551	1·8
Merchant service, 1876	198,638	2,270	87	11·4
Railways, 1874	270,000	1,000	270	3·7

The yearly loss of life in mines for 10 years ascertained from the official statement of the Mine Inspector is as follows:—

	Persons employed.	Deaths by accident.	Ratio of persons employed to each death.	Death rate per 1000 persons employed.
1873	514,149	1,069	480	2·079
1874	538,829	1,056	510	1·959
1875	535,845	1,244	430	2·321
1876	514,532	933	551	1·813
1877	494,391	1,208	409	2·443
1878	475,329	1,413	336	2·972
1879	476,810	973	490	2·040
1880	484,933	1,318	368	2·718
1881	495,477	954	519	1·925
1882	503,987	1,126	447	2·234
Average of 10 years..	503,428	1,129	445	2·243

Mr. Fenwick who, without any previous knowledge of the question, has only just given his attention to the subject, should hesitate before he makes such sweeping assertions, and should, at all events, be sure that his figures are correct before he casts aspersions on the conduct of men who have devoted a lifetime to their profession, and whose reputation is unsullied.

THEO. WOOD BUNNING,
Secretary to the Northumberland and Durham Coal Trade.
Coal Trade Offices, Newcastle-on-Tyne, March 17.

MINING PROGRESS IN BRAZIL.

SIR,—Your correspondent "Minas," dating Congonhas, Dec. 25, states that workmen at the Descuberto, or Brazilian Gold Mines (Limited), have received notice to quit, intimating that the first superintendent, Mr. Lott, was too conscientious to work as directed by the London management, which led to his resignation. No. 2 superintendent, Mr. Geach, reported having pounds of gold in the safe; yet the oracles in Brazil and London are silent. Passing strange it is too, in face of the fact, that an expert—Mr. T. S. Treloar, of Pari—had visited the mine, and reported in effect that if at Descuberto they happened to find stone containing a sufficient quantity of gold the mine might ultimately pay working expenses. Have Mr. T. S. Treloar's views during his management of the Taquaril been borne out by results?

Even now Pitangui and Pari Mines have his supervision, and very frequent modified methods of working to contend with or against, just as it happens. Possibly "Minas" will make a note of the progress at Pari, which might have been brought into a paying position fully eight months since, in spite of the many and various modifications there. Surely the time has quite expired when even an expert can frame a plausible excuse for further delay in bringing forward large returns of gold from the Santa Barbara or Pari Mine.—*Pool, March* 20. A. R.

DEER PARK, AND NEIGHBOURING MINES.

SIR,—Investors should consider that no foreign mines (however remarkable they may appear to have been in productiveness) have approached anything like the success obtained by Cornish or Devonshire mines in proportion to the capital employed, and it will always remain for historians to point out the splendid dividends paid in bygone years by such mines as Devon Great Consols, Wheal Friendship, and South Caradon. Therefore there can be no wonder that the present tendency is to seek out maiden properties in good districts with known lodes to develope for discoveries which shall rival those of the last generation. It is to the interest of all seeking to invest in mines that developments should proceed in maiden ground rather than reopen out deep shafts and levels full of water. There is no district, in my opinion, that shows such chances of success as that immediately round Devon Great Consols, and on this fact rests the search for, and the discovery of tin at Wheal Benny, at the eastern portion of Cornwall, bordering on the River Tamar. The geological strata is clay-slate, or the well-known Cornish killas overlying the granite, a position always favourable for the production of mineral and dividend-paying mines. Deer Park joins Wheal Benny to the west, and is midway between Wheal Friendship, the grand old mine of two generations ago, and South Caradon, the rich mine of 25 years ago. Old Wheal Friendship, Devon Great Consols, and South Caradon have yielded 7,000,000*l.* value in mineral ores at an original outlay of only 9000*l.*, and there are no other three mines in the world that have given such results.—*London, March* 19. E. B.

COPPER ORE STANDARD.

SIR,—I believe that there are comparatively few who understand the copper standard much better than your correspondent "C. W. J.," from Morriston, whose letter on this subject appears in the Journal of March 8. I do not profess to be an expert in this matter, but I may, perhaps, be able to throw some little light upon the subject, as I see that no one has attempted to reply to his letter. The standard includes the value of a ton of fine copper in the ores, plus the returning charges. As an illustration I will take the sale of ore at Swansea to which he referred—Feb. 27, 1883. The assay produce was 8¼. This 8¼ produce ores require 12 tons 2 cwts. 2 qrs. to produce 1 ton of fine copper. Then it is clear that 12 tons 2 cwts. 2 qrs. of ores at 2*l.* 5s. cost 27*l.* 6s. 5s. Then add to that amount the value of 1 ton of fine copper in the ores—55*l.* 19s. 11d.—there will be a total of 83*l.* 6d. 4d., which is the basis on which all the other calculations are made.—Rule: Divide this amount by the produce of the parcel, add the quotient to the standard for the whole sale.—Example: What is the standard of 6 per cent. on the above basis 83*l.* 6s. 4d., divided by 6 = 13*l.* 17s. 8d., plus the standard 81*l.* 17s. 4d. = 95*l.* 15s.? The answer which shows a value of 3*l.* 5s. 10d. per ton.

Take the second case of 5 per cent. ores: 83*l.* 6s. 4d., divided by 5 = 16*l.* 13s. 3d. + 81*l.* 17s. 4d. = 98*l.* 10s. 7d. The standard showing a value of 2*l.* 13s. 6d. per ton, and so on for the other calculations. Observe, if the produce for which a standard is required is higher than the produce of the basis the quotient must be subtracted, as the richer the ore the less cost there is, of course, to extract a ton of fine copper.—*Llanrwst, March* 18. JNO. ROBERTS, M.E.

DEEP LEVEL DRAINAGE, AND GROUPING OF MINES.

SIR,—Can the lead mines of this district be made to pay? is often asked by capitalists and others interested, and to this oft-repeated question I permit me to say that the leading mines of the district can be profitably worked both for lead and blende, and even with the present low prices, if those most concerned therein would combine together to work on the only practical system by which the mines can ever be made to pay, that is by working them in collective groups, and by deep level drainage. I have frequently, through the medium of the *Mining Journal*, endeavoured to show that all of the mines pacing south to south-west, including Aberllyn, Griffin, Cyrare, South d'Eresby, Ellen, Wheal George, East George, White Cliff, Coedmawr-pool, Bettws-y-Coed, and Glyn, could be cheaply and effectively drained to depths varying from 60 to 120 fms., and this drainage, if once effected, would render an available area of upwards of three square miles in extent, thoroughly drained and ventilated, to an average depth of 100 fms., the whole of which is traversed, crossed, and intersected by at least 30 known productive lodes, which could then be worked on the cheapest and most efficient method known—by stoping above adit and tramming direct to the dressing-floors.

I have not seen anything in the district to lead me to suppose that large deposits (such as enriched the Van and other mines for some years) will be met with, but the veins are so numerous, uniformly productive, and easily wrought, that from the great area at command and the inexpensive mode of working, the mines would not only be immediately remunerative, but permanently so; in fact, from their almost inexhaustable resources, that once drained they would be just as permanent as the mountain in which they are situate. This is not figurative language, but positive fact, and I can show many lodes productive of from 1 to 2, and even 3 tons of lead to the fathom within 20 fms. of surface that can be worked at 50s. to 90s. per ton; at other points blende lodes producing 3 to 5 tons to the fathom, worth at present (say) 4*l.* per ton, and all those points can be made continuous sources of profit, both from the present and from greater depths, by systematic working—in fact, several points can at once be worked both for lead and blende ores at profitable rates, the royalties from which would more than cover the dead rents, and thereby keep the properties free, and at the same time afford work and subsistence to the half-starved miners.

During the past year I have spent much time and money in the endeavour to bring those most interested together, with a view to united working, and practically draining and developing the various mines, but from the self-interested motives of some, and the half-heartedness of others, and chorus of complaints from different quarters, I am inclined to think the majority prefer tormenting themselves with the cry of hard times rather than putting out their hands to save their own interests. Would if not be better if they were to change their tune, come down here to spend their Easter holidays, see and judge for themselves, and by their united efforts afford us the means of making our known produce marketable in the "good times coming!" CHAS. KNEEBONE.

Bettws-y-Coed, March 19.

PRICE OF LEAD.

SIR,—My attention has been drawn to a diagram of average annual prices of English pig lead, prepared by Mr. Thos. Sopwith, M.Inst.C.E., who used to be largely concerned with lead mining in the North of England. It embraces a period extending back to 1767, and presents one remarkable feature—that from one cause or another there has been a marked depression in value of lead at intervals of about 50 years.

In the year 1780 the price is shown at 11*l.* 5s. per ton; then after various oscillations it reached 35*l.* per ton in 1806; but in 1832 (52 years from the date first quoted) it fell to 11*l.* 10s. per ton. Four years afterwards the price is shown in 1836 at over 25*l.* per ton; but in 1884, to which period, by the way, the diagram I refer to does not extend, the price has again fallen to 11*l.* 10s. Here, again, I note the same interval, 42 years. I draw attention to what seems a curious coincidence. Perhaps some of your numerous contributors may be able to give some explanation of the causes which influenced the depressions of 1780 to 1832, and state whether it was due in these years to political causes, or is it to be ascribed like the present depression to over-production. CHAS. F. SMITH.

Palace Club, London, March 17.

POLCREBO TIN MINE.

SIR,—It is gratifying to find that the recent discoveries in this mine are exciting great interest in the immediate district. Since the Great Wheal Vor, and the many surrounding mines ceased to work, very little has been attempted, and speculation of the kind had nearly died out; but it has been clearly shown by these discoveries that the latent element in the Cornish blood wants nothing more than a few demonstrated facts of the kind to fire the whole system, and bring again into action those grand old enduring qualities of the hopeful, patient, and persevering element that have done so much for this country in every description of enterprise, and has especially brought to light hidden treasures in every country of the world.

London, March 13. M. N.

REPORT FROM CORNWALL.

March 20.—We were not among the more sanguine folk who looked for an advance in the tin standards last week, but it is a fact nevertheless that at one moment such an advance seemed almost certain, and that it may come almost at any time, possibly when it is least expected. It would only be fair play that anticipations should just now and then fail to be realised when they are adverse, seeing how often hope has failed of fulfilment. Fair play, however, seems to have been very absent from any considerations of home mining enterprise, and we are learning to put up with—if not precisely to be thankful for—very small mercies indeed. The specially hopeful sign noted in the West at present is the disinclination of the smelters to accept current rates. As a rule stacking has rarely paid when practised by the mines, but the smelters have frequently turned it to good account, and if current rumour is true that is just what they are doing at the present moment. Whether it is literally the case that some of the smelters have their hutches full we are inclined to doubt—exaggeration is both common and easy—but that tin is being held for the rise in the county we have no doubt whatever, nor have we any that the rise must speedily come. East Pool is adopting the same line with regard to the wolfram, of which it has what is practically a monopoly just now; holding here, therefore, is certain to pay, for the demand for this ore is much larger than it was a short time since, and seems likely still further to increase.

Attention has been called to the fact that the price of dynamite is just half what it was before the monopoly was extinguished, and that it is likely to be reduced very materially still further. The consumption is now very large indeed—so large that it is not at all improbable that the reduction has led to waste, and that the saving effected in comparison with the work done is by no means equivalent to the reduced cost. This is a point that in some minds, at any rate, is well worthy of attention. The large consumption, too, and its importation into the district in bulk, contrasts somewhat amusingly with the stringent precautions which are now being taken by the Customs authorities to prevent its clandestine importation by examining even the smallest packets brought by passengers from abroad. It surely is not a very difficult matter to procure dynamite at home, and it would be better for the mines at any rate if it were.

REPORT FROM DERBYSHIRE AND YORKSHIRE.

March 20.—The depressed state of the Coal Trade is now being seriously felt, and in several parts of the Midland field a reduction of wages has become a necessity. Notices at several collieries has been given to terminate existing contracts for the purpose of reducing the prices hitherto paid for the getting of coal. About 18 months ago an advance of 10 per cent. was given in several districts, when the prices of coal did not admit of it, but since then a considerable change has taken place. The inflated prices of November and December last, caused by the agitation on the part of the men for more wages, has given way to a very different state of things, and coal is now lower than it has been during the last two or three years, whilst wages, on the other hand, are higher. There is, therefore, every probability that there will be a general reduction in the prices paid to coal-getters now that the quietest portion of the year is close at hand.

In Derbyshire there has of late been a considerable falling off in the demand for house coal in particular, and even the London market has become much quieter than for a very long time past, whilst prices have also gone down to a low and unremunerative point so far as the colliery owners are concerned. This shows the necessity so frequently urged in these reports for the mineowners becoming their own merchants, and selling direct to the consumer, from whom a good profit is extracted, whilst the supplier in the first instance—the colliery owner—has to be satisfied if he finds that he has sold his coal without incurring any loss. Steam coal has gone off fairly well considering that there is not much sent to any port for exportation; seeing the distance there is even to the nearest. Colliery owners in South Derbyshire and Nottinghamshire one would have thought, would have endeavoured to make use of Boston Deeps for reaching the home ports in particular, seeing that there is always plenty of water for the vessels, which is said not to be the case at Sutton

Bridge, over which the Great Northern Railway Company has spent a large amount of money in making docks, mainly for the shipment of coal, but which has certainly not turned out a success.

The railway companies, however, take a good deal of the Derbyshire hard coal, and this, combined with the large quantity required in the smelting of iron, is of great importance as affecting the output. As regards gas coal, the tonnage being sent away becomes gradually less, as is usually the case at this time of the year. It may, however, be said, with respect to Chesterfield, the lighting for which during the past year has been by electricity, that there is now every sign that ordinary coal gas will be again resorted to. The electric light, indeed, has been anything but a success; for some of the lamps have turned out at times most erratic, and would persist in going out at the time when the most light was required. The iron trade is of a steady character, so far as the output of pig is concerned, the principal consumption being on the part of the local mills and foundries.

In Sheffield trade generally is worse than recollected for the last few years, and a good many workmen are to be seen daily walking about from no fault of their own. The lighter branches are particularly quiet, and even the best known firms or companies in the cutlery trade find some difficulty in providing their workmen with full employment. The demand on the part of American merchants for all kinds of knives is still particularly dull, and is evidently not likely to be better, as the tariff is evidently turning out more adverse as regards English goods than was at first anticipated. All kinds of tools, including saws, files, and engineers' material, are also in a similar position. There is a tolerably fair make of Bessemer, although the rail mills do not take anything like what they formerly did; but other channels have been found for it in various shapes, especially as regards secondary qualities of tools and cutlery. The ordinary plate mills are still comparatively quiet to what they have been, and there is not so much doing in sheets. But there has been no falling off as regards the production of armour plates, for in these there is plenty doing, large contracts being in hand that will take some time in working off. A considerable tonnage of mild cast steel is also being absorbed in the making of plates, and there is every prospect of an increased demand for them for both ships and boiler purposes. Some of the foundries are looking better than they did, orders having been received for pipes as well as for ranges and stoves as well as for castings for ordinary building purposes.

The South Yorkshire Coal Trade is particularly quiet, and the price of household qualities in particular has come down to a point that leaves profit out of the question. Steam coal continues in steady demand, and a good deal is being sent to Hull for shipment on account of the South Yorkshire Steam Coalowners' Association, whose agents have been most successful during the last year or two in making the valuable qualities of that description of fuel known to shippers, foreign Governments, and the owners of steam vessels. On Wednesday the men at the Barrow Company's colliery, near Barnsley, had the usual 14 days' notices served upon them, which is considered as the preliminary to a reduction of wages, in all probability to the extent of 10 per cent.

REPORT FROM NORTH AND SOUTH STAFFORDSHIRE.

March 20.—The state of the Iron Trade is not such as to cause any improvement in the demand for manufacturing coal. The collieries continue irregularly employed, and the outturn is not by any means up to the full capacity of the pits. Prices continue unsatisfactory: 10s. to 9s. is quoted for furnace coal, 8s. to 7s. for best mill coal, and 6s. 6d. to 5s. for forge coal, according to the district where mined. There are indications of some improvement in the pig trade, but the prices at which business is doing, and at which further business is proposed, are low. Native cinder pigs are 40s. to 38s. 6d.; Northamptons, 44s., delivered; and the Thorncliffe brand 57s. 6d., delivered. Hematites are 57s. 6d. to 58s. 6d. In a few directions some good sales of blast-furnace cokes have of late been made. Tredegar (South Wales) cokes are quoted 15s. delivered, and have seen a large business. Foundry descriptions are quoted 19s. to 21s. for Durham sorts, and 19s. to 20s. for Glamorgan makes. Pottery mine from North Staffordshire is in small supply, and vendors ask 17s. 6d. to 18s. delivered. The finished iron trade does not revive, and orders are offered at such a price that makers are compelled to refuse them. In sheets this is particularly the case. Bars are quiet, at 8*l*. 2s. 6d. to 7*l*. 10s. for marked sorts, and 6*l*. 15s. to 6*l*. 10s. for good second qualities. The ironmasters have given notice for a reconsideration of the wages question in a month's time.

At a large and influential meeting of the South Staffordshire and East Worcestershire Coalmasters' Association, held at Birmingham, Mr. J. B. Cochrane, the President, in the chair, it was resolved to call a joint meeting of the Wages Board to consider the question of miners' wages, and it is considered that the state of trade does not warrant the present rate of wages.

The Chillington Iron Company's report for the past year is no improvement upon its predecessors. The trading shows the large turnover of 354,213*l*., but there is a loss of 5449*l*. This is attributed to the fact that prices have ruled low in all departments. Finished iron, say the directors, has fallen 20s. per ton, whilst prices of pig-iron and other raw materials has been but slight. The directors propose to exercise the borrowing powers of the company, so as to raise the sums necessary to repay the loans included in the balance-sheet item of 87,117*l*., known as accounts due by the company. In order to retrench as far as possible, they propose also to reduce salaries by 1500*l*. per annum.

The South Staffordshire Institute of Iron and Steel Works' managers held their monthly meeting at Dudley, on Monday. Speaking upon Mr. J. E. Stead's paper "On the Chemistry of Iron Purification," Mr. Percy G. Gilchrist remarked that red-shortness in iron was frequently due to oxygen, and not to sulphur, as was sometimes supposed. It was to be hoped that some chemist would give them a quick trustworthy test as to oxygen. A rough-and-ready test for red-shortness was to drift a piece of the metal. If a puddler continually produced iron with red-shortness from his regular materials a remedy might be found in an addition of phosphorus or manganese.

The North Staffordshire Coal Trade has not improved to any great extent. The demand is weak and irregular, whilst prices are so variable that it is difficult to get a reliable quotation. The pig-iron trade is in the same predicament. About 40s. to 45s. per ton appears to be the rate now ruling. The finished iron makers are hopeful of a change for the better. The foreign and colonial demand shows slight improvement, but as yet there is no effect upon prices. Common crown bars are named at 6*l*. to 6*l*. 7s. 6d., and 5*l*. 15s. upwards for ordinary common. Hoops are dull, at 6*l*. 5s. to 6*l*. 10s. There has been a reaction in the demand for plates. Prices are dull, however—quoted at 7*l*. 10s. to 7*l*. 15s. for tank and girder sorts.

REPORT FROM LANCASHIRE.

March 20.—The actual weight of orders which are coming forward in the Coal Trade of this district is still only small, and not at all sufficient to take away anthing like an average output of the pits, which, except in the Manchester district, are, as a rule, only kept running about four days a week; there has during the past fortnight been a better demand than has been experienced since the commencement of the year. During the past fortnight the output of the pits, although of a restricted character, has been going away with but little accumulation of stocks, and for the ordinary trade sale prices have been fairly maintained. The future, however, is not looked forward to very hopefully, and sellers in many cases are open to make concessions for quantities, whilst for forward delivery there is also a disposition to take low prices. House fire coals, which have been in moderate demand, average at the pit mouth about 9s. to 9s. 6d. for best qualities, such as Wigan Arley, 7s. to 7s. 6d. for seconds, such as common Arley and Pemberton Four-feet; and 6s. to 6s. 6d. for common house fire coal. The common classes of round coal continue only in limited demand for ironmaking and steam purposes, and for these very low prices are taken, ordinary qualities averaging 5s. 6d. to 6s. per ton at the pit. Although there is no actually large demand for engine fuel, the small quantity of slack now being produced causes supplies to be scarce, and prices are very firm at full rates, bungy averaging 4s. 6d. to 5s.; best slack, 4s. to 4s. 3d.; and good ordinary qualities, 3s. 3d. to 3s. 6d. per ton at the pit mouth.

For shipment there has been more enquiry, and in the coasting trade there has been a moderate business doing. Very low prices, however, continue to be taken, and good Lancashire steam coal has been sold at 7s. 3d. to 7s. 6d. per ton, delivered at the Garston Docks or the high level, Liverpool.

In the Iron Trade there is a continued, but only very small, weight of new business coming forward. So far, however, as local and district makers of pig-iron are concerned, they have still a sufficient weight of iron to deliver against old contracts to keep them going, and they show little or no disposition to press sales on the present basis of prices, whilst buyers, on the other hand, are quite indifferent about giving out orders beyond what they require for immediate wants.

Occasional offers are put forward in the market at low prices, but these do not result in actual sales of very large extent. During the week the business done has been confined to a few comparatively small transactions, and where buyers have had to give out orders they have found it very difficult to place them at anything under the minimum current rates of about 44s. to 44s. 6d., less 2½ for forge and foundry qualities delivered equal to Manchester. For outside brands, such as Scotch and Middlesborough, there is a firmer tone in the market. The finished iron trade continues extremely dull, and to secure orders local and North Staffordshire makers have had to give way in their quoted rates of 6*l*. for bars delivered into the Manchester district, 5*l*. 12s. 6d. being now more nearly the average figure, with Cleveland bars and plates offering freely at 5*l*. 12s. 6d., and even less than this is taken in some cases for good specifications.

The engineering trades generally throughout Lancashire, though without improvement, continue fairly steady, and employment in most branches continues moderately good, the last returns of the Amalgamated Society of Engineers showing a slight decrease on the number of members out of work in the Manchester and Salford district.

A new design for corrugated furnace flues, which will no doubt interest mineowners who are large users of steam, has just been introduced by Mr. F. D. Rose, of Manchester. This consists in tapering the corrugations down to nothing at the bottom of the flue, and this form has been adopted to avoid the danger of unequal strains, which Mr. Rose contends is always present in flues made of equal strength at the bottom as they are at the top when working. Mr. Rose points out that the tops of the furnaces of all boilers are the weakest, and in other arrangements heating surface and strength is given where it is not wanted, which by setting up an unequal strain is the cause of all fractures to the front ends of boilers, and he claims that by his method of construction he provides what is needed for actual working requirements without an unequal strain on the flues.

TRADE OF THE TYNE AND WEAR.

March 20.—The general trade of this district still continues much depressed; there is little, indeed, doing in connection with shipbuilding, although the men have in most cases agreed to a reduction in their wages. Marine engineers also now feel the want of new orders, and the number of hands has been considerably reduced at the great Jarrow Works, Palmer's, and at many other works, and there is now a movement for the reduction of wages in those trades. The masters aim at a reduction of from 10 to 5 per cent.—really they wish them to accept the same amount of wages as was received prior to the advance in May, 1883. It is expected that generally the men will accept reductions, but we will not be surprised if serious opposition is offered to the reduction at the works, where a majority of the men are members of the Amalgamated Society of Engineers. The engineers' strike at Sunderland still continues, and the men, backed by the above society, still firmly adhere to the position they took up in June last. Locomotive engineers continue to be fairly employed on these rivers. At the great works of Sir W. Armstrong and Co., Elswick, there is a great amount of work on hand of a miscellaneous character. These works include a large arsenal, where guns and all necessary war appliances are manufactured, blast-furnaces, hydraulic engine-works, &c., and extensions are still in progress. A large new fitting shop has been opened during the present week. The works in connection with the new shipbuilding yard here are in active progress. Founders are well employed on pipes, &c., and there is a great amount of bridge work in the district, more than has been received for many years.

The putting out of blast-furnaces has had a serious effect on the Coal and Coke Trades, still on the whole we consider that the coal trade is in a more healthy state than any other branch of business. The demand for steam coal has slightly improved; small and manufacturing coals are also shipped in considerable quantities to the Baltic, prices and freights being favourable for present shipment. The gas coal trade is, of course, dull at this season, and there is not much life in the house coal trade. There is not much change in the value of any kind of coal, with the exception of house coal which has receded a little in price lately. The make of coke is still being reduced in Durham, and yet some makers find it difficult to dispose of all their produce. The North Brancepeth Coal and Coke Company have decided to put out 40 coke-ovens at their Littleburn Colliery, near Durham, and a large number of men, miners, and cokemen, have received notice to terminate their engagements. A serious dispute occurred last week between the miners and the manager at the great cokeworks of Messrs. Straker and Love, near Auckland, and 5000 men received their notices to cease work. The difficulty has, however, been nearly settled, and no stoppage of work is now expected. The coal and coke shipments at Tyne Dock are generally taken as a guide as to the bulk of shipments on these rivers, and these shipments have not as yet fallen off much. For the week ending March 15 they amounted to 84,281 tons, against 86,115 tons on the corresponding week last year, showing a reduction of 1834 tons. It must also be noticed that the harbours in Northumberland, Blyth, Amble, and Berwick, have been improved, and the shipments of steam coal have been increased there, and this affects to a certain extent the shipments at Tyne Dock.

There is a much more cheerful feeling in the Iron Trade, prices are much firmer, and altogether a stronger tone. Shipments are expected to increase largely, and at the present moment the ironmasters fully anticipate that they have placed the iron trade on a much better position by putting out so many furnaces. The Scotch iron trade is also in a much better state, and this has an important influence on the Cleveland iron trade. The market at present is in a very sensitive state. There was, however, an increase of stocks in the three winter months in Cleveland of 76,000 tons, and these will take some time to work off. The reduced wants of the manufacturing branches of the trade must also be considered. Ship-plates are down to 4*l*. 17s. 6d.; 5*l*. is, however, the market quotation, and the same for common bars. Until a revival takes place in the iron shipbuilding trade the great iron and steel trades of the district must continue depressed. On Monday a meeting of the Board of Conciliation and Arbitration for the North of England iron trade was held at Darlington—Mr. Whitwell presiding. The notice of the employers (given on Feb. 26) was read, for a reduction of 1s. per ton on puddling and 10 per cent. on all other forge and mill work, to take effect at the end of the month. A long discussion took place as to the question of reviving the sliding-scale, as Dr. Watson had recommended this course, and both sides approved the principle; but they could not agree as to the basis of the scale. Mr. Stanley moved, and Mr. Head seconded, that the matter in dispute be referred to arbitration. This was carried unanimously, and Dr. Spence Watson was again appointed arbitrator to decide the wages question for another three months.

There is still much agitation about the proposed Shipping Bill of Mr. Chamberlain, and there is much controversy respecting it. The opponents of the measure are especially fierce and vigorous. Shipowners and commercial men generally appear to have concluded hastily that the Bill must inflict serious injury on the shipping business, and attempts have been made with the view of influencin Parliament to bring political and other organisations into the field. Their object appears to be to shelve the whole Bill if possible by getting it referred to a Select Committee. The details of the measure have been very little discussed. It must, however, be borne in mind that the object of the Bill is to amend the law, so as to save life and property at sea; and there is no doubt whatever that there is a great necessity for such an amended Bill. No doubt there may be serious objections founded on reason against some clauses of the Bill, but these may be discussed and amended in Committee. The proposal to apply the Employers' Liability Act to shipping naturally provokes much opposition, but surely the sailor's life ought to receive as much protection as the miner and others. The opposition to the various Acts regulating the working of mines met with great opposition; but the working of these Acts has proved that on the whole they have been found to be beneficial to the owners of mines as well as the workmen.

The Miners Permanent Relief Fund has on the whole been successful in Northumberland and Durham, and it has proved of very great benefit to the miners. At the present time there are upwards of 70,000 members in the fund. The colliery owners in the district have also given very substantial support to the fund, many of them having contributed 20 per cent. of the gross contributions of the men, but when the Employers' Liability Act was passed a bad feeling was caused to some extent, and many of the owners ceased to contribute to the fund. An attempt has now been made to induce the owners to renew their contributions to the fund. On Saturday last a general meeting of the Northumberland colliery owners was held at the Coal Trade Office, Newcastle, Mr. John Straker in the chair, when a deputation from the Miners' Fund attended, and after a few remarks from the Chairman, Mr. Alexander Blyth, the secretary to the fund, introduced the subject, and asked the colliery owners for a renewal of their support to the fund. After some discussion it was deemed advisable to refer the matter to a future meeting of the trade. The gentlemen present expressed their good wishes for the success of the fund, and it was expected that good will result from the meeting.

The Chemical Trades on these rivers continue fairly prosperous, and the great advance in the price of the leading products—bleaching powder, &c.—during the past year is fairly maintained. The working of the salt beds on the Tees is continued. In the vicinity of Port Clarence Messrs. Bell Brothers are proceeding rapidly with another bore-hole, which has now been sunk to a depth of 760 ft. It is expected that in two months hence the salt deposits will be reached by this bore-hole, and the firm will then be able to pump the brine both night and day, and thus enormously increase the output of salt. The new chemical works which the firm are erecting at Port Clarence are approaching completion. Little progress has yet been made in applying the electric lamp for use in mines; there is no doubt, however, that ultimately this will be accomplished. It appears that Mr. Mangin lately demonstrated the safety of his miners' electric lamp by placing it in the middle of a balloon filled with hydrogen. The appliance consists of a Swan incandescent lamp immersed in a glass globe containing water. The light is further intensified by a copper casing, silvered inside, and one or more strong lenses.

TRADE IN SOUTH WALES.

March 20.—The coal shipments of last week exhibited a good average at all the South Wales ports. Cardiff sent away 148,526 tons foreign and 23,876 coastwise; Newport, 27,771 tons foreign and 16,940 coastwise; Swansea, 14.450 tons foreign and about 10,000 coastwise. Prices of steam coal may be quoted at about 11s. 3d. to 12s. 3d. for best qualities, and second-class about 1s. lower. House coal is in weak demand. Prices range from 9s. to 10s. Patent fuel was sent away from Swansea to the extent of 9846 tons, while Cardiff exported 8217 tons. The demand is fairly good. There is no change to report in the iron and steel trades. Newport sent away one parcel of 546 tons to London, and one of 480 to Para. Cardiff exported 685 tons in the aggregate. Iron ore has arrived in large quantities, which must help to keep prices low. Newport received 13,463 tons from Bilbao, and 1160 from other places; Cardiff, 6809 tons from Bilbao, and 3025 from other places. There is an improvement to note in the tin-plate trade; good IC cokes realise from 15s. 6d. to 16s. per box, while charcoals fetch from 17s. to 20s. The inferior sorts, which are sold at 14s. 9d. for the American market, help to ruin the trade there, as they fail to give satisfaction. The small stock recently thrown upon the market is now exhausted, and speculators must pay higher prices or fail to do business at all.

The Council of the South Wales College has resolved upon appointing a Professor of Engineering at an outlay of 300*l*. per annum and a share of the fees. Mr. W. T. Lewis, of the Allardy, Lord Bute's mineral agent, has promised to give 26*l*. per annum for a scholarship for a period of years, and it is hoped that others may be induced to follow his example. No region presents a better field than South Wales for the study of the mining engineer, and geology and metallurgy are sciences which can be as fitly followed, as every appliance is at hand. If the Mayor of Swansea was to throw his energies with equal zeal into founding a technical college there, instead of endeavouring to rob Aberystwith College of its well-won though ill-requited labours, he would perform an excellent service. Swansea, with its copper, zinc, nickel, spelter, and tin works, seems to be the very spot upon which a technical college would thrive.

REPORT FROM NORTH WALES, SALOP, AND CARDIGAN.

March 20.—The Coalbrookedale Company recently came to the decision to close their Horsehay Works in consequence of the unprofitable nature of their operations there. They gave the employees notice to this effect. The latter sought an interview with the owners, and after several conferences the men agreed, rather than have the works closed, to accept a reduction of wages, the tradesmen and shopkeepers of the neighbourhood agreeing to charge the men reduced prices for their goods. The ironworks of Shropshire and North Wales continue generally in fair work, but at low prices. Among the foundries the works of the late Mr. Job Ellis, of Oswestry, built 15 years ago, are offered for sale. Most of the iron manufacturing works are busy, so also are the various railway wagon companies which have establishments in the district.

An illustration of the distress caused by the depression in lead mining is furnished by the Llanarmon district, a district by the way which a few years ago attracted considerable attention in the Journal. Here the poverty of the people is very great, so much so that they cannot afford to pay the school fees of the children. The Duke of Westminster has very generously stepped forward and engaged to do this to a considerable extent.

I referred a week or two back to the copper-bearing rocks to the north-west and south-east of Snowdon; I have since been pleased to see that an attempt is being made to work some of these copper deposits, including the old historic mine of Drws-y-Coed with Symdde Dyliuan as one concern in a more vigorous and systematic manner than heretofore. The copper ores of this region are sulphides, yielding about 10½ per cent. of copper.

Rejoicings have been held in Nantlle and Carnarvon over the coming of age of Mr. J. A. A. Williams, son of the principal owner of the Dorothea Slate Quarries. The people of Carnarvon presented Mr. Williams with a silver epergne and an illuminated address, and the workmen at the wharf at Carnarvon with two silver stands. All the workmen at the quarry were entertained at dinner, and at night there were bonfires and fireworks.

The report of the North Wales Narrow-Gauge Railway for 1883 shows a general increase in traffic receipts, a decrease in passenger traffic, and an increase in slate and merchandise. Several important slate quarries—Braich, Fron, Alexandra, and Glanrafon—are connected with this little line, and some other quarries near Bettws Garnon which have been temporarily closed are about to be restarted. If I might offer advice to the owners of this little line I would say, first, "mend your ways," and, secondly, "extend the line to Beddgelert." Sauntering along the slate quay at Carnarvon the

other morning it was pleasant to see the activity displayed in loading vessels, and the number of ships there were loading and waiting to be loaded.

The Shropshire and Denbighshire Railway Bill has passed the Common's Committee, so has the Bishop's Castle and Montgomery Extension. Considerable opposition is being made to the Chester and Connah's Quay Bill. This is, however, a very important link in the series of railways now projected, and it will have to be made. In the meantime the Chester Town Council have resolved to oppose the Bill, and to support a scheme for the improvement of the navigation of the River Dee. A portion of a tunnel on the Bethesda and Bangor Railway has given way, injuring in its fall five men of a gang of navvies who were working in it at the time. The accident is said to be due to the recent rains. The traffic returns of the Cambrian Railway Company show a decrease of 836*l.* in the receipts since the commencement of the half-year as compared with last year. There are two causes which have contributed to this—first, the diversion of the slate traffic from Festiniog by the London and North-Western line to Conway; and, secondly, to the decline of lead mining in Cardigan and Montgomeryshire, with the general depression in trade consequent upon this. The new dock which the London and North-Western Railway Company are making in the estuary of the Conway for the slate trade is progressing.

The Great Holyhead road is now being taken over by the county authorities. They have asked the Government for 13,000*l.* to put the road in repairs first, but the Government, by the advice of their surveyors, offer only 4500*l.*

MIDLAND DISTRICT MINERS' FATAL ACCIDENT RELIEF SOCIETY—The report and statement of accounts just issued, and which extend from the date of inauguration in May last to Dec. 31, are of a very encouraging and gratifying character. It appears that during that time 9300 members had been enrolled, and there were 16 deaths from accidents amongst the members. In addition to the payment of funeral allowances and legacies in each case, eight widows with 23 children had received sums varying from 7s. 6d. up to as much as 1*l.* per week each. Ordinary members' subscriptions amounted to 802*l.* 15s. 2d., to which must be added 1952*l.* received from the trustees of the Hartley Colliery Relief Fund, making a total of 2754*l.* 14s. 2d. Funeral allowances and legacies absorbed 135*l.*, annuities reached a sum of 60*l.* 15s., and 80*l.* 5s. 6d. was applied to the management account, leaving in hand a balance of 2478*l.* 14s. 8d., or a surplus of 526*l.* 14s. 8d. on the six months' working. Such a result is highly satisfactory, especially when it is considered that the number of fatal accidents was above the usual average. The management fund (to which the subscriptions of honorary members and colliery proprietors are devoted) shows a deficit of 60*l.* 19s. 3d., but this is accounted for by the preliminary expenses incurred. The Society, which is under the presidency of the Duke of Devonshire, appears to be admirably and economically managed (the general secretary—Mr. William Saunders, of Derby—and his staff having proved themselves thoroughly competent for the duties entrusted to them), and will doubtless become the model for other similar organisations. The fatal accident at the Manners Colliery last week, by which a man, named Job Barker, lost his life, has once more directed attention to the advantages offered by the Midland District Miners' Fatal Accident Relief Society. The unfortunate man (luckily for his widow and children) had joined the Society about three months ago. The total amount of contribution he had paid when his death occurred was 1s. 1d., and this small investment has secured for Mrs. Barker a sum of 7*l.* 10s. for funeral expenses, with a weekly allowance of 17s. 6d.—2s. 6d. for each of her five children until they are old enough to work, and 5s. for herself for life. This weekly allowance will be regularly received, no matter whether trade is bad or wages low. Strikes will not interfere, holiday times will make no difference, and the source will never fail. A grain of fact is worth an ounce of theory, and with such an illustration as the one here given appealing to the common sense of the miners, there ought to be no difficulty in persuading the hundreds in this district who have hitherto held aloof to join this excellent Society without further delay. The Society is one in which every miner may place the fullest confidence.

HORSES IN NEW SOUTH WALES.—At the close of 1882 there were in the Colony 74,766 draught horses, 85,837 light harness horses, and 190,048 saddle horses. The majority of these animals are superior to those of a similar class in the United Kingdom.

MPROVED ARRANGEMENT FOR WORKING UNDERGROUND PUMPS BY MEANS OF HYDRAULIC PRESSURE.

MR. R BERT THOMAS MOORE, B.SC., CIVIL AND MINING ENGINEER, GLASGOW.

The problem of how best to drain our mines is one of the greatest interest to an Institution such as this; and the appointment of a committee to consider the subject, shows that the Council fully appreciate it. As a contribution, the writer ventures to describe a new method of pumping water from mines, whereby a steam-engine, placed on the surface, can give motion to a pump placed at any distance from it in any direction, without pump-rods of any description. The hydraulic sinking pump figured in the above engraving was designed for the Eureka Consolidated Mine, Nevada; its full capacity 600 gallons per minute from 600 ft.; the diameter of power ram is 5½ in.; the diameter of hollow pump rams, 18 in. and 12·73 in.; and the stroke 6 ft. It would be easy to dilate upon the inconvenience of pump-rods, and upon the expensive nature of their upkeep, and also upon the destructive and expensive nature of breakdowns, when the full power of the engine is continued without any resistance. This, however, is so well known to the members of this Institute (Mining Institute of Scotland) that it is unnecessary to take up the time of the meeting discussing it.

But it may be stated that these difficulties have, in a great measure, set men thinking as to whether they could not dispense with pump-rods altogether; and the direction that this so far as taken has been to place the steam-engine at the bottom of the pit or in the mine, carrying the steam from the surface; or erecting steam boilers underground. In some instances applications of hydraulic power—such as that employed by Mr Johnstone, one of our members—have been in successful operation for draining dooks, the power being obtained from the rising column of the pump, worked by the engine on the surface. The arrangement about to be described is a form of pumping water by hydraulics. Advantage is taken of the fact that water is practically incompressible; and that if a pipe of any length is filled with water, a piston placed at one end will if pushed forward propel a piston placed at the other in the same direction. If there were two pipes and two pistons moving in opposite directions, there would thus be a reciprocating motion. The leading ideas are:—1. That the water confined in the pipe shall be pressed at not less than 1000 lbs. per square inch, so that the plungers and pipes may be of small diameter. 2. That there shall be a connection between the two mains, to do away with shocks. 3. That the height of any lift may be 300 fathoms. 4. That while the water in the plunger may travel at any speed from 80 to 100 ft. per minute, the speed of the water in the pipes may be 300 ft. per minute.

These preliminary remarks prepare for the description of the system, which is the invention of Mr. Joseph Moore, of San Francisco, who has appeared before this Institute. The system is suitable for all three classes of pumps:—1. For pumps placed at the bottom of a vertical shaft. 2. For pumps placed inside the workings. 3. For sinking pumps. In all these cases the steam-engine is place at any convenient position on the surface. It will be convenient, in the first place, to describe the engine, which in the drawing is shown as a horizontal one, with the piston-rod passing through each end of the cylinder, and having a plunger on each end. While this form of engine has been shown, it is evident that any form of engine can be employed which gives a reciprocating motion to the two rams; or the rams may be attached to cranks where the engine has a rotary motion and the speed is reduced by gearing.

The pump placed at the bottom of the shaft is the same as the dook pump. Two pump plungers, A and B, are placed horizontally, with the stuffing-boxes facing each other and the usual clack-pieces at each end. They draw water from the same suction and discharge it into the same rising main. They carry a cross-head, C, between them, and to this are fastened four power-plungers, D, D, D', D', two on each side. These power plungers are connected to the power rams on the surface by two power pipes, E, E', the plunger, *d*, being connected to the plungers, D, D, and having the same area as the two, and the plunger *d'* being connected to D', D'. When the steam piston moves from *d* to *d'*, the ram *d'* forces the water down the column of pipes E', into the underground power plungers, D', D', and the pump is driven from B to A. When the stroke of the engine is reversed, the water from *d* is forced down the power pipe, E, to the plungers, D, D, and the pump moved from A to B, while the water in the plungers, D', D', is driven back the power pipes E' to refill the plungers, *d'*. In this way the pump underground is driven backwards and forwards, following the motion of the steam-engine on the surface, the water in the power pipes never being changed. The pressure pipes are filled with water from a cistern placed at a level above each of them, through valves, G, which open only inwards, and so prevent the water from flowing out.

In order to prevent shocks by the stoppage of the moving column, and any irregularity between the movement of the power plungers above and those below, the power pipes are connected, so that by opening a relief valve, V, the water may pass from one column to the other. This is effected by means of the following arrangement:—The cross-head, C, carries a bar, D, which is so fixed that at the end of the stroke it comes in contact with a small bell-crank, E, which opens a valve, V, between the two pressure pipes. The necessity for this valve and its action will readily be seen. Thus if the engine on the surface were about to begin a stroke from *d* to *d'* while the power rams underground were at D' the stroke in the pumps could not be made. The cross-head would open this valve, and allow the water to pass through it from the pipe E to the pipe E' until the stroke was completed. The engine on the surface and the pump underground would then be in their right positions, and pumping would begin.

The pump underground may be put up vertical or in any other position. To pump 200 gallons per minute from a depth of 130 fms., with a steam-pressure of 40 lbs. per square inch, the steam-cylinder would be 26 in. diameter, the power plungers on the surface 5 in. diameter and 4 ft. stroke. The pump underground would be 8 in. diameter and 4 ft. stroke, with the power rams 3½ in. diameter. The pressure pipes would be 2¾ in. diameter and ¼ in. thick. The dook pump is precisely the same as the one described, the only difference being that the water is conveyed to any required distance. The high pressure on the pressure plunger enables a very compact arrangement to be made for dook pumping. Thus to pump 120 gallons per minute 20 fms. an 8 in. pump plunger, 2 ft. stroke, and two 1½ in. power plungers would be required, while the power pipes would only be 1 in. in diameter.

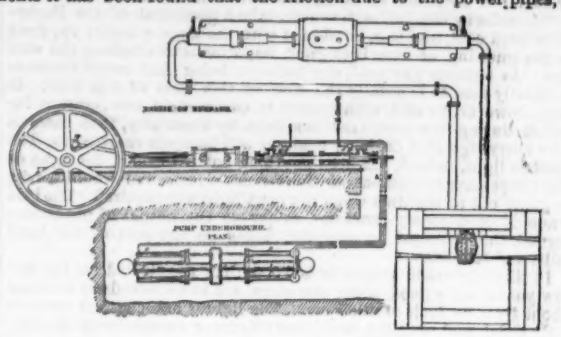
In the arrangement for sinking the columns of pipes and the plungers slide in wooden guides, O, O, in the same manner as a cage, and are lowered down as the sinking proceeds. They are suspended by two sets of rods, R, of sufficient strength attached to the cross-head of a hydraulic ram, which raises or lowers the pump and pipes. In this case the plungers are placed vertically, and the one plunger is half the area of the other, so that the pump is double acting. The reason for using this form of plunger is that the distance from the water to the bottom of the plunger is less than would be in any other case. D D, D' D' are the power rams, and their action is the same as in the dook pump. The lower pump plunger, A, is 18 in. diameter. At the bottom of the plunger casing is a clack-piece; below that is the suction. The plunger is hollow, and has a clack inside of it. The upper plunger, B, is 12·73 in. diameter, and is also hollow, and the water from the lower plunger passes up through it into the rising main. S is the stuffing-box of the large plunger; T of the small one. The upper casing is connected to the rising main, and the lower casing is hung from the upper one by four bolts.

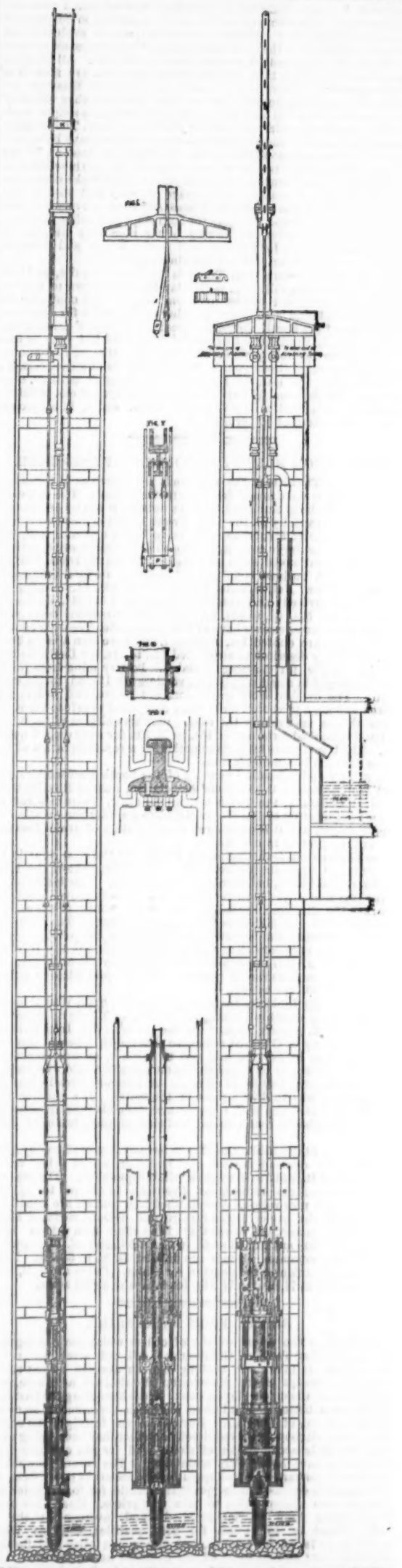
The following is the action of the pump:—When the plungers ascend the lower plunger lifts a quantity of water represented by the diameter of 18 in., and it passes up through the lower valve, the valve inside the plunger remaining shut. When the plungers descend the valve at the bottom shuts, while the valve in the plunger opens, allowing the whole water from the 18-in. plunger to pass through it; but as at the same moment the 12-in. plunger is descending out of the casing only half of the water ascends to the surface, and the other half fills the space occupied by the 12-in. plunger. When the plunger ascends again the 12-in. plunger discharges the water into the rising main. Immedintely above the upper barrel is an air vessel, 14 ft. long, made of sheet-iron. The water passes up a central pipe, which dips down from the top of the air vessel, and it is the annular space round this central pipe which forms the air space, the central pipe communicating at the top with the rising main. A cup and small discharge pipe are provided for receiving, and at convenient intervals discharging, any sediment deposited from the ascension pipe. The rising main is made of malleable iron in 24 ft. lengths, and having cast-iron flanges rivetted to them. The joints are spigot and faucet, and are made with a ring of guttapercha ⅜ in. in diameter.

The hydraulic ram is worked with a small hydraulic engine, and rises and lowers the whole column. The lever which works this engine stops the main engine on the surface and opens a valve communicating with the power pipes so as to let off the pressure due to their sliding into the sleeve-pipes. The upper two lengths of the rods are provided with holes, into which a cross-head, K, is put for the plunger of the ram to press against. Attached to the girder which supports the ram are two rods, A, A (*Figs.* 1 and 2) of the same strength as the main rods, carrying a cross-head, B, with recesses like a boring tool for catching the heads of the rods, which have a shoulder made to fit it. When the ram has run its full length this is put under the rods, and the whole weight of the pipes, &c., rested upon it. A new length of rods is put in, and the ram is run out till it comes in contact with the cross-head. The temporary rest is then removed, and the ram is ready for further lowering. On the top of the rising column is placed a hogger of sufficient length to allow the water to fall into the discharge drain for 24 ft., or any other length required, but the power pipes work in stuffing-boxes, L, M.

The clacks are made of hard vulcanised indiarubber, confined in the upper lid, and have given great satisfaction. The clack in the inside of the 18-in. plunger beats upon a face cast upon it at H (*Fig.* 4). The clack itself is the same as the lower one, but as the arrangement for changing it is somewhat peculiar it may be well to describe it. The smaller plunger is carried down into the middle of the larger one, as shown in the drawing, and terminates in a recess in which works the T-shaped head of the clack. When it is in operation the lid has free room to move up and down without check. When the clack is to be shifted the column of water is run off, the pump raised to the top of its stroke, and the upper plunger disconnected from the lower one, and suspended by two links. The lower plunger is then lowered down. The clack lid remains hung by the T head on to the inner plunger, and, as the lower plunger descends, is left outside, when it is drawn out of the slot and renewed. The lower plunger is then raised and the two connected, the clack having then room to work as before. The stuffing-boxes of the rams are rounded at the bottom and top, as shown in drawing (Fig. 3), and this has also been found to be a great advantage. One sinking pump of this description has been at work for the last 12 months, raising 300 to 500 gallons per minute 600 ft., and has given great satisfaction. Practically there has been no difficulty, and the thing has moved on, and moves on quietly.

The advantages claimed for the system are—Its extreme simplicity, there being no valves employed except the clacks of the pumps. The facility with which it can be applied at any distance from the engine. The small space which it occupies in consequence of the high pressures used. There is no danger of fire, nor any heat from steam-pipes. The engine on the surface can be much better looked after than if it were underground. It can be started although covered with water, and if it is a sinking lift can be raised up to the surface if necessary. As compared with an engine working with pump rods there is the entire absence of pump rods. The only disadvantage is the extra number of stuffing-boxes, and the friction of the power rams in stuffing-boxes over what would be if the piston were appl ed direct without the intervention of the water. From careful experiments it has been found that the friction due to the power pipes,





and the power and water plungers, with properly constructed pipes and stuffing-boxes, does not exceed 11 per cent., which is much less than the friction in pump rods.

FOREIGN MINING AND METALLURGY.

The French Iron Trade has continued extremely quiet. Business has been done in iron at Paris at 6*l.* per ton, and even, according to the reports current, upon lower terms. In the Nord the state of affairs has not experienced any material change. In the east of France the blast-furnaces have orders on hand for casting pig to the aggregate extent of 120,000 tons; but notwithstanding this the situation is regarded as far from favourable, especially at Longwy. In consequence of the heavy stocks on hand, the extinction of sundry furnaces in the Nancy group is said to be in contemplation. Prices have remained low upon the French markets; white pig has been quoted at 2*l.* 5*s.* to 2*l.* 8*s.* per ton for small quantities, and at 2*l.* 1*s.* 8*d.* to 2*l.* 4*s.* per ton in the case of large transactions. The production of refining pig in France last year is returned at 1,616,903 tons, as compared with 1,597,749 tons in 1882. Casting pig was produced last year to the extent of 450,484 tons, as compared with 441,318 tons in 1883. The production of merchant iron in France declined last year to 800,380 tons, as compared with 882,840 tons in 1882. The production of iron rails in France laat year was 19,178 tons, as compared with 27,016 tons in 1882. The production of iron plates in France last year was 148,510 tons, as compared with 163,165 tons in 1882. The production of steel rails in France last year was 381,178 tons, as compared 336,259 tons in 1882. The German iron trade has continued weak and dull. The aggregate production of pig in Germany last year is returned at 3,380,788 tons, as compared with 3,170,957 tons in 1882, and 2,914,009 tons in 1881.

The improvement recently noted in the Belgian Iron Trade has, happily, continued. Orders have become more numerous, and they are more easily obtainable, although prices are still very low. The stoppage of two blast-furnaces has been determined on in the Hainaut. The production, when thus reduced, will, it is thought, be all the more readily disposed of. No change can be reported in quotations. English casting pig has remained at 2*l.* 2*s.* 6*d.* per ton upon the Belgian markets. No. 1 iron has made 4*l.* 16*s.* per ton; No. 2, 5*l.* 2*s.* per ton; and No. 3, 5*l.* 8*s.* per ton. Girders have made 5*l.* to 5*l.* 4*s.* per ton; No. 2 plates have brought 6*l.* 6*s.* per ton; No. 3, 7*l.* 2*s.* per ton; and plates of commerce 8*l.* 14*s.* per ton. The John Cockerill Company has obtained an order for 12,500 tons of steel rails at Buenos Ayres. The Council of Administration of the Thyle-Chateau Blast Furnaces and Forges Company has just reported progress for 1883. It appears that during the year the four blast furnaces belonging to the company produced between them 58,025 tons of refining pig. The company's steel foundry and rolling-mills produced last year 14,794 tons of ingots, 12,525 tons of rails and steel sleepers, and 2549 tons of rails and accessories. The low rates current for rails did not allow the company to push forward the production of steel with much energy last year, and the demand for iron rails was, of course, insignificant. No dividend is recommended upon the company's share capital for 1883.

There has been little change in the general tone in the Belgian Coal Trade. No variation is anticipated in quotations until April, the month of the year in which summer prices usually come into force. Coke continues to exhibit a good deal of depression, indeed prices have still further given way, producers showing a disposition to make serious sacrifices in order to recover ground which they have lost in competition with Germany. As, however, times are generally hard it is difficult to attain the object indicated. The number of trucks loaded with coal and coke which passed over the Belgian State Railways in the week ending March 9 was 18,740 tons, as compared with 17,002 tons in the corresponding week of 1883, showing an increase of 1738 tons this year. The production of coal and anthracite in the French mining districts in the second half of 1883 is returned as follows:—Nord and Pas-de-Calais, 5,263,009 tons; Loire, 1,828,452 tons; Gard, 1,021,935 tons; Burgundy and Nevernais, 809,697 tons; Tarn and Aveyron, 593,577 tons; and Bourbonnais, 506,301 tons. The production of the other French coal mining districts in the second half of the year 1883 did not amount to more than 200,000 tons. The total production of coal and anthracite in France in the second half of last year was 10,729,364 tons, to which we must add 279,764 tons of lignites, making an aggregate of 11,009,128 tons. The production of coal and anthracite in France for the whole of 1883 is returned at 20,887,092 tons, as compared with 20,046,796 tons in 1882, showing an increase of 840,296 tons last year. There has been an increase of activity in the German coal trade.

MECHANICAL ENGINEERS' VISIT TO CARDIFF.—It is evident from the energy of the local engineers that the visit of the Institution of Mechanical Engineers to their district will be made as enjoyable as practicable. The local Mechanical Engineers' Association have, at a meeting presided over by Mr. McConnochie, invited the co-operation of the mayor and of the leading firms in the district, asking each of the latter to appoint a representative to form one of the general committee which will be established at once for the purpose of making arrangements to give a fitting reception to the Institution. It is expected that from 300 to 400 of the leading engineers in the country will be present. The meetings will begin on Tuesday, Aug. 5, and will last during the week, the real business concluding on the Friday evening. The local committee discussed the succession of events in connection with the visit. Cardiff has progressed marvellously since the Institution visited it 10 years since, so that there will be plenty to amuse and instruct those attending the meeting.

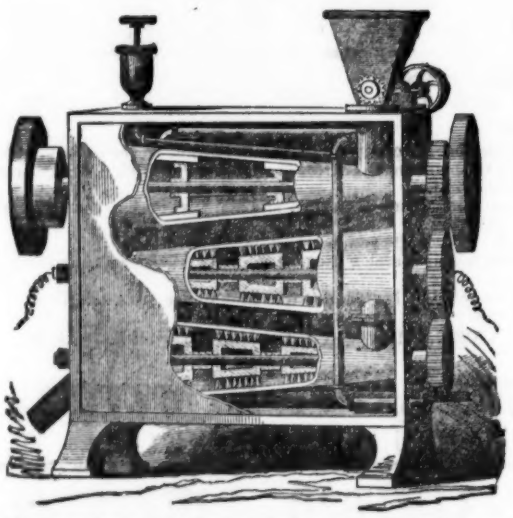
SHERRIFF'S OCEAN MAIL DIARY.—Under this title a handsome sheet, giving the month's information with regard to the ships of the various passenger lines to India, America, Africa, and Australasia has been issued. There are also a full time-table of the mail service for March, a table of postal information, and other details. The Diary is at once clear, accurate, and useful.

HOLLOWAY'S OINTMENT AND PILLS.—Few persons are so favoured by circumstances or so fortified by Nature, as to enable them to pass unscathed the sore trials of an inclement season. With catarrhs, coughs, and influenzas everywhere abounding it should be universally known that Holloway's ointment, diligently rubbed upon the chest, checks the worst assaults of these maladies, and securely wards off more grave and dangerous diseases of the throat and lungs. The truth of this assertion must remain unquestioned in the face of thousands of unimpeachable living witnesses, who have personally derived the utmost possible benefits from this treatment when their present sufferings were appalling, and their future prospects most disheartening. Both remedies act admirably together.

NOVEL ELECTRO METALLURGICAL MACHINE.

PROFESSOR JAMES MANES AND SONS call the attention of miners, mineowners, capitalists, and others interested in the working of gold or silver mines to their new Electro Metallurgical Machine for extracting fine and rusty gold from sands or tailings of stamp mills, or the sands of hydraulic gold diggings, or from the black sands on the coast of Oregon or California, and other parts of the world where gold is found.

The problem that has long troubled the worker of free-milling gold and silver ores is a method to save the mineral now lost in the tailings of stamp mills or flumes. This alone, if it could be saved, would amount to many million dollars profit each year, besides enabling the working of much territory which is now lying idle for want of an economical and thorough process of treatment.



Prof. James Manes and Sons, of Denver, Colorado, U.S., have invented a machine (represented in the above engraving) which it is claimed will save nearly the entire amount of mineral which passes through it, the loss not being over 10 per cent., and in many cases not in excess of half that amount. The machine is a cheap and practical process—it never need stop for charging or cleaning up, being nearly self-acting. Steam, electricity, and mercury are used in the process of extracting the mineral.

This machine or amalgamator is adapted for free-milling gold or silver ores, or refractory after roasting. It consists of a series of three or more large cylinders, wider at one end than the other, placed one above the other in a horizontal position, a shaft or spindle running through the centre of each.

The ore and mercury are fed into the first cylinder, passing into the second, and then to the third. The first cylinder is furnished with steel mullers which nearly touch the sides of the cylinder, and revolve at a good rate of speed, mixing the mercury and ore. The second cylinder is furnished with large steel brushes attached to the shaft or spindle, revolving at a high rate of speed; through this a current of electricity is furnished by a Westinghouse dynamic electro machine, which materially assists in gathering the particles of very fine gold together, and thoroughly amalgamating the metal and mercury. The third cylinder is similarly furnished to the second; into this the amalgam passes, and is again acted upon and mixed by the brushes to catch any gold which might have escaped amalgamation in the second. A fourth cylinder may be used if found necessary.

The amalgamated pulp then passes through a revolving copper drum, plated with quicksilver inside. As the drum revolves it takes up the most part of the amalgamated gold. As the inside of the drum is constantly washed with a spray of water from perforated pipes fixed inside of said drum, a clean-plated surface is constantly brought in contact with the pulp or tailings as it passes out from the cylinders. After leaving the drum it falls down on to incline copper plates, the same as is now used in stamp mills.

The amalgam can be collected from the drum and plates without stopping the machine, and any live quicksilver that passes will be caught in syphons. The tailings are carried off with the water. The machine when attached to the flume will be driven by the waste water; it sifts the fine sands from the coarse gravel, and amalgamates it as above.

The specific points claimed by Prof. Manes and Sons in their patent are—

1.—The saving of almost all the mineral passing through the machine.

2.—The loss being less than 10 per cent.

3.—The entire absence of loss of the amalgamated material, thereby saving all he mercury, which, with the processes now in use, there is a large loss both of mercury and the precious metal.

4.—The small cost per ton at which the ore can be treated.

By the addition of the powerful current of electricity that passes off the revolving brushes, the most minute particles of gold will be caught and retained, which in the ordinary flume and stamps passes off with the water; this often amounts to a large percentage.

The inventors state that if English stock companies will give their assistance to work the black sands of Oregon and California by paying for the building of the machines, they will take a share of the gold for their services, or they will send their machines to any part of the world, or will sell patent rights to those desiring any of their patent machines or revolving furnaces for roasting or melting ores, ball pulverisers, &c.

Prof. James Manes and Sons are agents for the Morey and Sparey Ball Pulveriser, that crushes and pulverises at the same time, and does as much work as eight stamps in a day, crushing either wet or dry.

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BAXTER'S PATENT KNAPPING STONE BREAKER.

1851.

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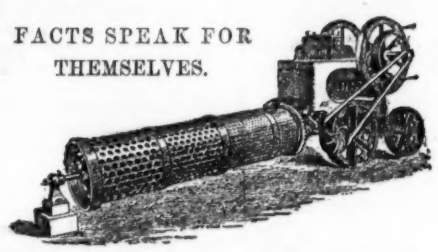

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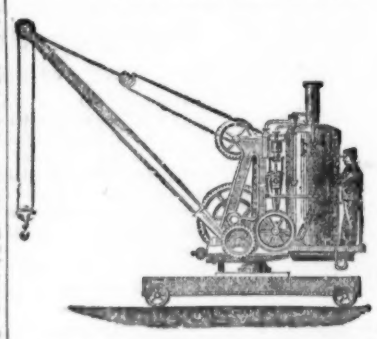

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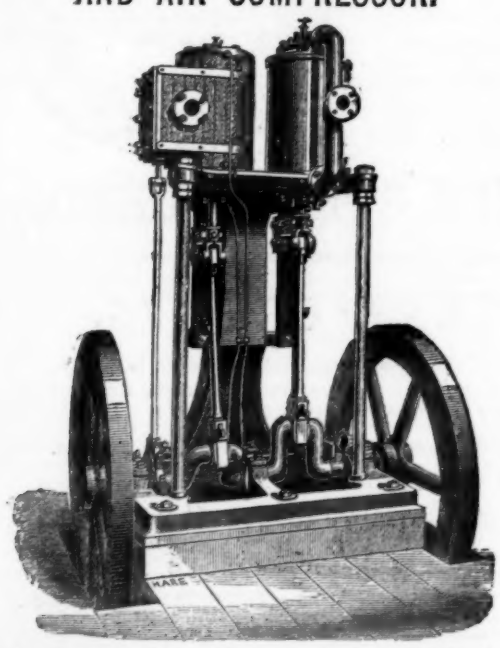

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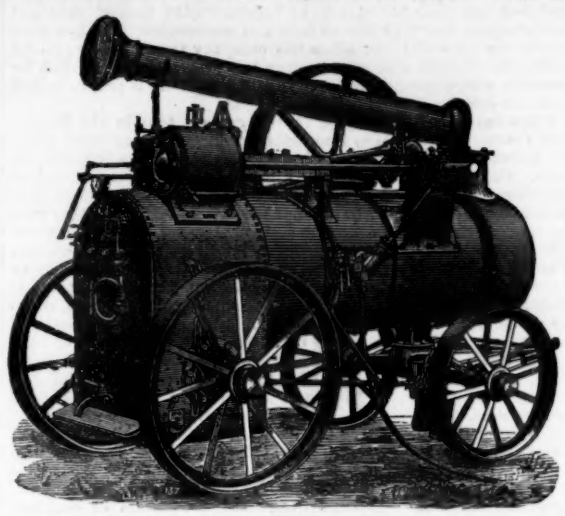

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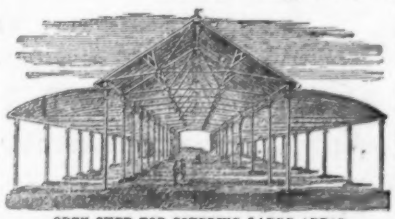

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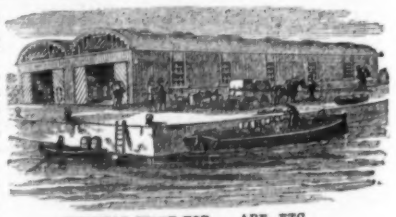

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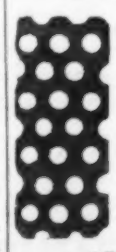

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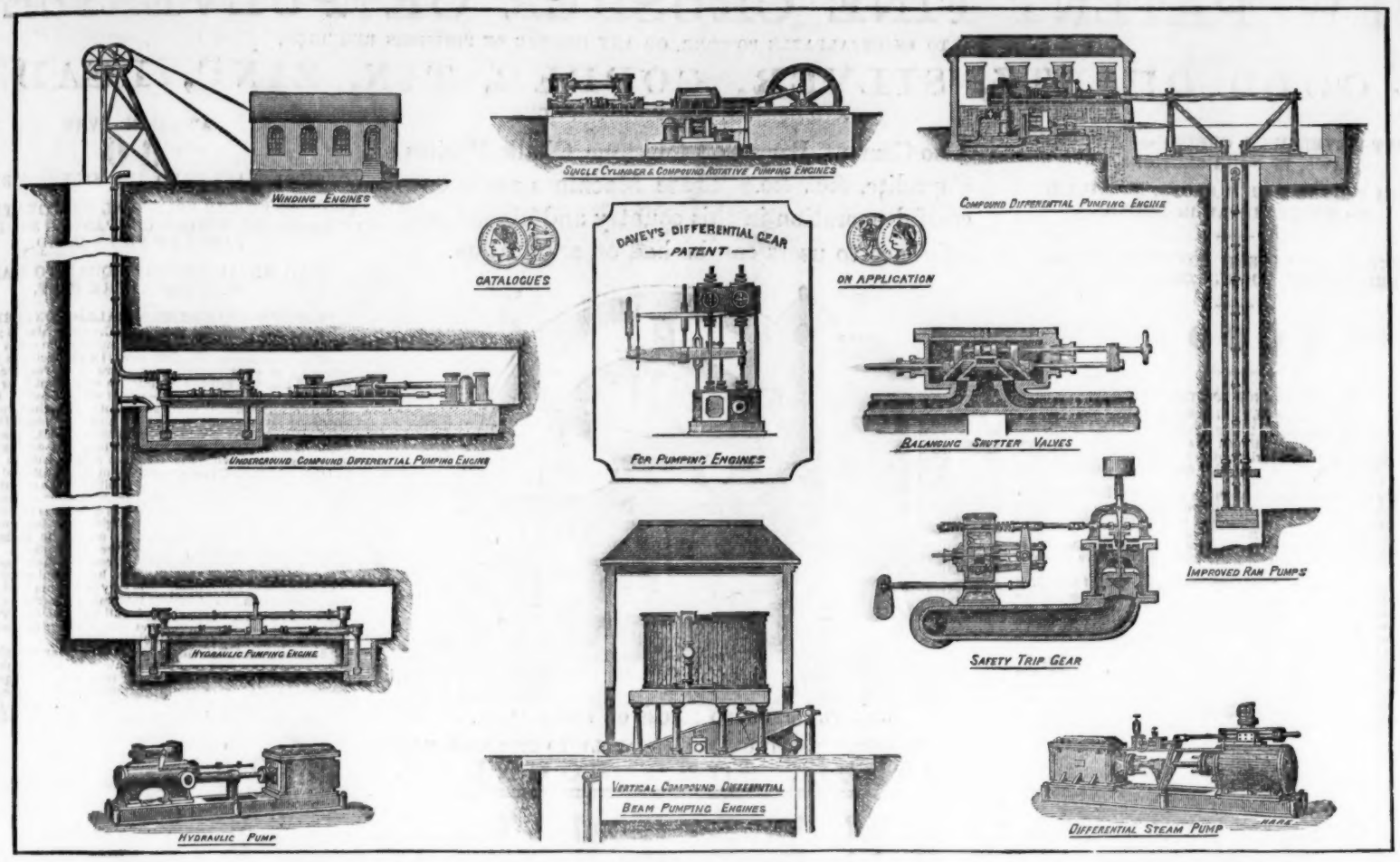

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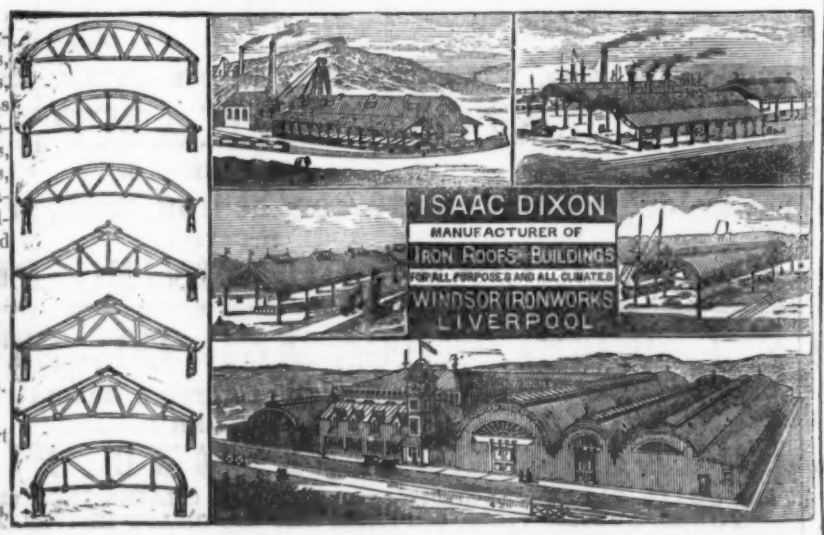

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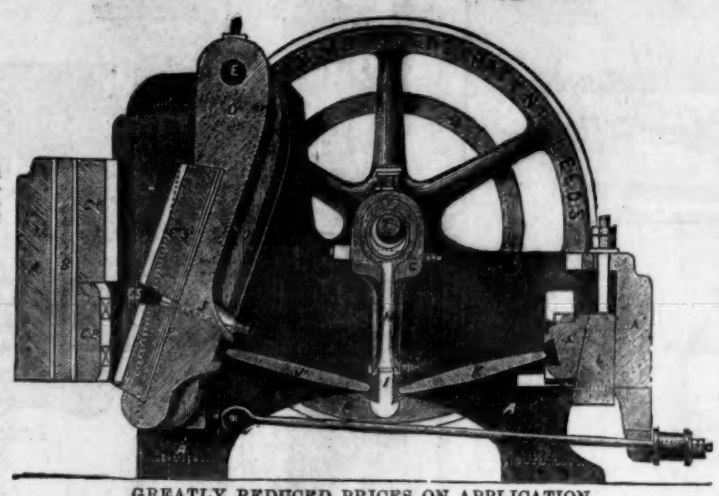

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"Our experience is that the motion and mechanical arrangements of your machine are the best for pulverizing that we have ever met with."

"The reports from our mines as regards the working of your Fine Crusher (20×5) recently supplied are very favourable, although we cannot quote you exact figures. On being got into position it was tried *by hand*, with the result that it made short work of the biggest pieces of ore we put into the hopper. You might say how long you would take to deliver another of the same size."

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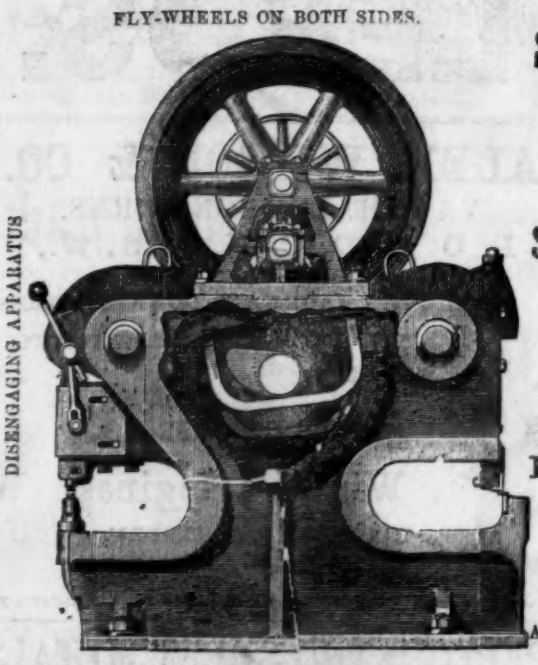

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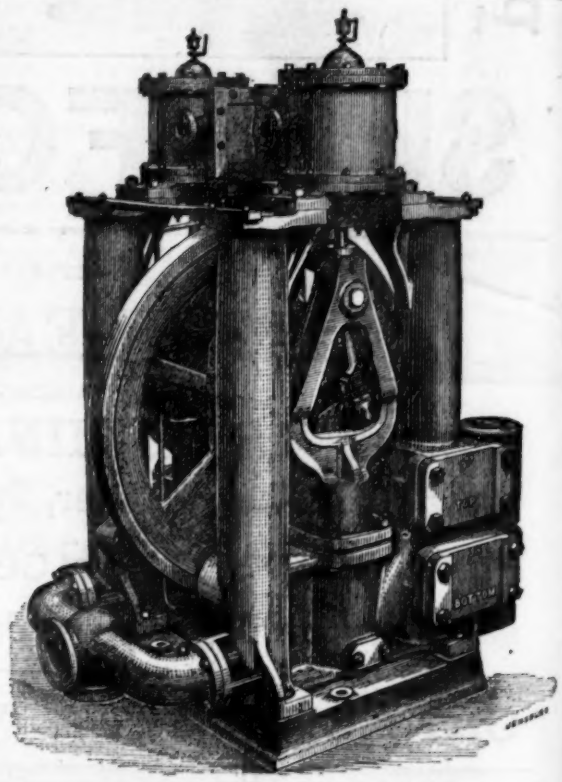

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